PIT AND QUARRY

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CENTRAL SERIAL RECORD
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AUGUST, 1942

FOR 25 YEARS THE LARGEST PRODUCER CIRCULATION IN THE FIELD

LUDLOW-SAYLOR

CONTROLLED-TEMPER SUPER-LOY WOVEN WIRE SCREENS

for super-severe service

●

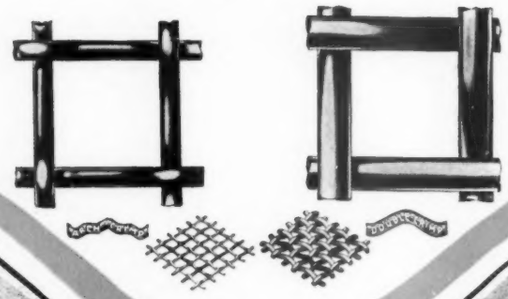
SUPER-HARD, SUPER-TOUGH, SUPER-STRONG

CONTROLLED-TEMPER SUPER-LOY WOVEN WIRE SCREENS

withstand abrasion longer—

endure vibration better—

resist fatigue to the utmost



The background at top of page shows the "Perfect" Double-Crimp Weave.

The small cuts in the center panel compare Arch-Crimp Weave and Double-Crimp Weave.

The border at foot of page shows "Perfect" Double-Crimp Steel Wire Cloth which has been hot-dip galvanized after weaving.

Samples on request.

The LUDLOW-SAYLOR WIRE COMPANY SAINT LOUIS

AUG 21 1942
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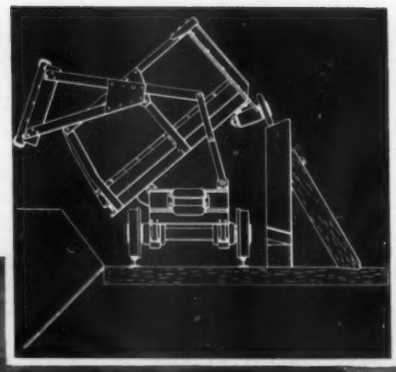
EASTON GRANBY CARS

A fundamentally sound design which combines low overall height with large capacity for mine haulage. One of many Easton mine car designs, the Granby is moving mountains of ore daily in iron, lead, zinc, limestone and other underground mining operations. Diagram at left shows how Granby car is dumped automatically when roller at back rides over the inclined rail. Easton designs and installs the complete system.



Keep moving with EASTON

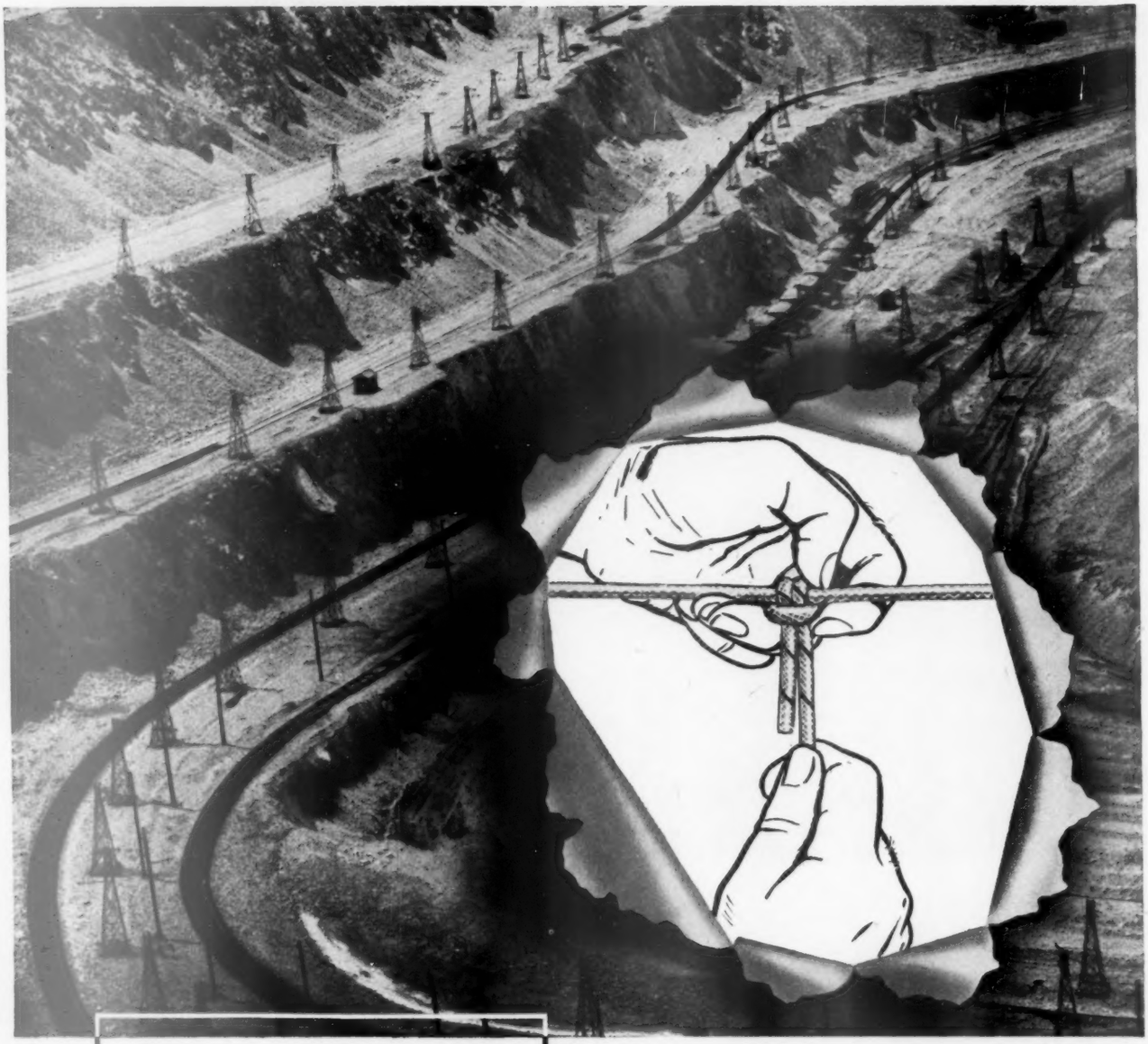
It is *your* job to keep mountains of earth, ore and rock moving from where they are to where they are needed in the War Production Program. It is *our* job to help you to design track or trackless haulage equipment to fit your requirements, to adapt the design to the availability of materials, and to follow each order through to earliest possible delivery. May we get to work on your haulage problem *now*—to help you achieve your desired capacity at lowest cost per ton? Write to Easton Car & Construction Company, Easton, Pa.

The famous EASTON Phoenix Quarry Car. Doorless. 2-way dump. Timken Bearings.

EASTON Cornwall Mine Car. With automatic downfolding door. Timken Bearings.

The EASTON TR-15H Trackless Mine Car. A matchless record in quarry service.

PIT AND QUARRY, August, 1942. Vol. 35, No. 2. Published monthly by the Complete Service Publishing Company, 538 South Clark Street, Chicago, Ill. Subscription price $1 for 1 year in the U. S. and possessions, Canada, Central and South America; elsewhere $1 additional for each year. Single copies 25 cents. Entered as second-class matter February 28, 1932, at the Post Office at Chicago, Ill., under the Act of March 3, 1897.



It takes this switch at nearly 4 miles a second

This half hitch knot is an important junction in the Primacord network. See that it's tied properly—so that the branch line is at right angles to the trunk line.

Once the powerful explosive force of Primacord has been released, it streaks through the hookup like a bolt of lightning! It hits every switch, every cartridge in every hole—at 3.85 miles a second!

The tremendous shattering force created in a Primacord giant blast results in finer fragmentation, makes it easier to remove material. Time, labor and money are saved. For this and other reasons you'll find Primacord excellent for your work.

THE ENSIGN-BICKFORD COMPANY
SIMSBURY, CONNECTICUT
Manufacturers of Safety Fuse since 1836

PP-47

PRIMACORD-BICKFORD DETONATING FUSE

MORE BARRELS of Cement

The giant MEDUSA plant

per Ton of Coal

Thanks to EIMCO SLURRY FILTERS

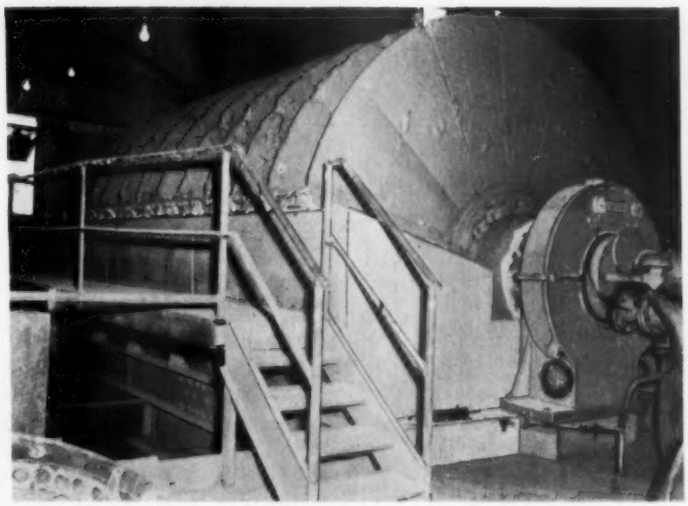
The recently modernized plant of the Medusa Portland Cement Company at Silica, Ohio, now ranks among the outstanding production projects in American industry.

One of the most successful improvements in the system is the installation of three of the latest type EIMCO Continuous Vacuum slurry filters. Two of these are already in operation, and they have made a wonderful showing in feeding the kilns.

These EIMCO Filters have materially lowered the fuel consumption per barrel of clinker produced and have also increased the capacity of the kilns.

EIMCO Filters are "must" equipment for obtaining maximum efficiency in cement plant operation.

Write today for our Bulletin No. 404 describing EIMCO Equipment, including Drum, Disc and Top Filters, Jaw Crushers, Ball, Rod and Tube Mills, Thickeners, Diaphragm Pumps, and Loaders.



One of the three EIMCO 11-disc filters which dewater slurry for the kilns

The EIMCO CORPORATION

FACTORY— Salt Lake City, Utah

Chicago Office: 111 W. Washington St.

New York Office: 120 Broadway

Knee-deep in trouble . . . with pleasure!

IT IS A COMMON SIGHT to see Mack trucks do things that, for most trucks, would be near-miracles. Why does this happen so often? The reason is simple. *A Mack is more truck to begin with.* We do not build Macks just to stay even with somebody else, but to be beyond all doubt or question the *best* trucks in the world. *And an unequalled record stretching back over forty years says that's exactly what Mack trucks are!*

Mack Trucks, Inc., Long Island City, N. Y.

Mack

TRUCKS

FOR EVERY PURPOSE

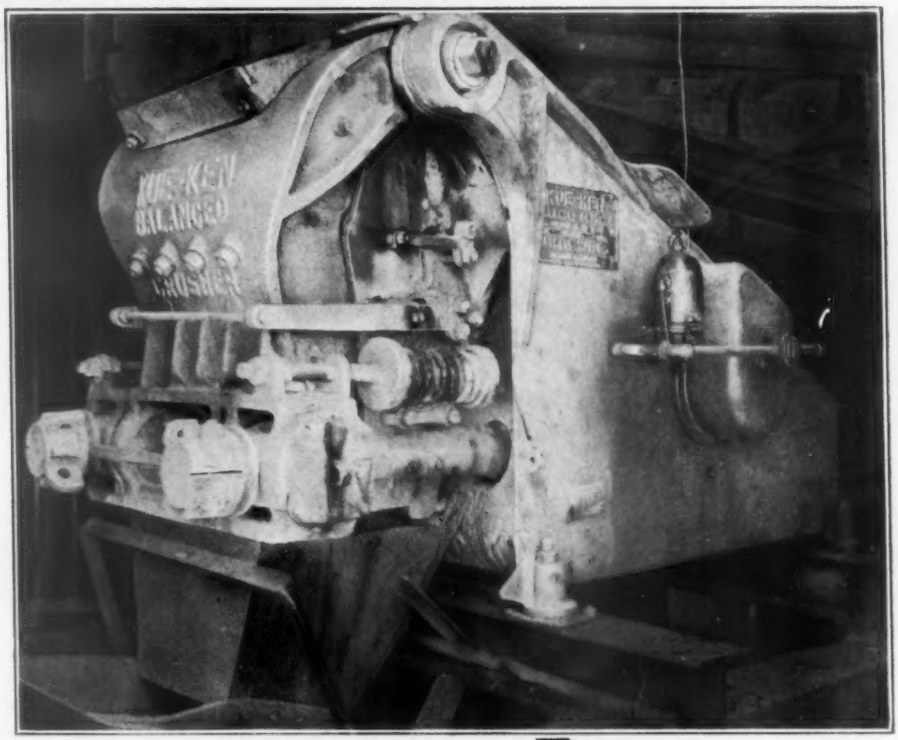
ONE TON TO FORTY-FIVE TONS

BUY U. S. WAR BONDS

IF YOU'VE GOT A MACK, YOU'RE LUCKY . . . IF YOU PLAN TO GET ONE, YOU'RE WISE!

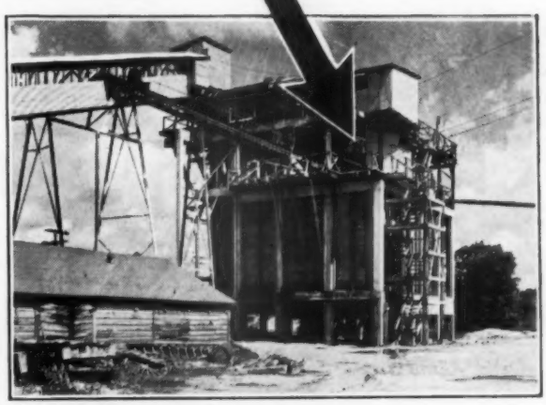
BALANCE

CAN DO THIS FOR YOU TOO!



The above photo was taken while the KUE-KEN was running. Note the complete absence of vibration. The arrow points to the location of this crusher up on top of the bins.

KUE-KEN's perfect balance permitted this Texas gravel company* to put their KUE-KEN crusher up on top of the bins where it belongs. With an ordinary crusher on the ground level, they would have to elevate the material up to the bins again. Their KUE-KEN saved them the cost of an elevator. It can do the same for you.



HERE'S ADDITIONAL SAVINGS—

The *exclusive* KUE-KEN principle of crushing without rubbing is giving users from 5 to 10 times more wear from jaw plates. (We guarantee at least 3 times more than any other crusher or a new set free). KUE-KEN crushers will crush 2 to 5 times more than any other crusher of equal jaw size. Horsepower requirements are 1/3 to ½ as much per ton as ordinary crushers.

*NAME ON REQUEST.

Our free crushing test service enables you to send samples of your rock for crushing in a KUE-KEN, and obtain a screen analysis of the crushed product. Tells you exactly what a KUE-KEN will do on your rock. Prepaying freight on your samples is your only obligation. Several sizes are available, and immediate delivery can be made on priority. Complete description in Bulletin 602.

404 CHESTNUT ST. **OAKLAND, CALIF.**

STRAUB MFG. CO.

Kue-Ken Balanced Crushers	Rib Cone Ball Mills	Screenwheel Classifiers
Overhead Eccentric Crushers	Feeders	Amalgamation Barrels
Concentrating Tables	Spiral Classifiers	Standard or Sectionalized

No. 1 SOURCE OF AMERICA'S MIGHT-IRON ORE

from Mahoning-Hull-Rust open pit at Hibbing, Minn.

● This largest of open pit iron mines is 2 miles long, ¾ mile wide and 250 ft. deep. The ore taken from this mine is more than all the earth moved in building the Panama Canal.

PMCO

WELDED DIPPERS

IN 1941 approximately 8,000,000 tons, of the total 20,000,000 tons of ore removed from this pit, was dug with PMCO Welded Dippers. More PMCO dippers are constantly being used here because their unusual strength stands the strain of continuous operation and because their welded construction permits a saving in dipper weight that adds as much as 30% to the payload capacity of the shovel.

● Investigate the possibilities of increasing the payload capacity of your shovel with a PMCO Welded Dipper.

We operate the largest and most complete manganese steel foundry in the United States

PETTIBONE MULLIKEN CORPORATION

Established 1880

4710 West Division Street, Chicago, Illinois

"AMAZING" said the inquiring reporter "... to what do you attribute your long life, Mr. Tiger Brand?"

START WITH A GOOD ROPE LIKE ME — INSTALL PROPERLY — AND THEN

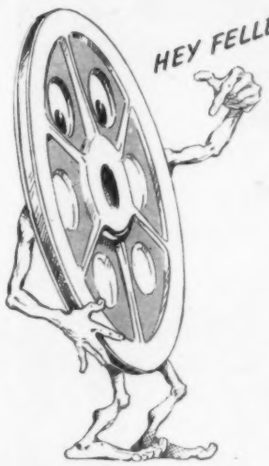
1. SLOW AND EASY BREAKING IN—

Always advisable after you install a new rope. It allows the component parts of the rope to adjust themselves to the conditions under which the rope is to operate. With Excellay Preformed this breaking-in period can be shortened — but the time spent in this early period will pay handsome dividends in added rope life.

2. CORRECT LUBRICATION.

Lack of proper lubrication is one of the most common causes for premature failure. Lubrication is required not only to protect the rope externally, but it must have sufficient penetrating power so that it will protect the inner wires against corrosion and friction. So be sure to give your wire rope periodical and careful lubrication.

HEY FELLERS!



3. DON'T FORGET SHEAVES

—they are of prime importance in prolonging rope life. Your sheaves must be of ample diameter to prevent excessive bending stresses in the rope. Sheaves must fit the rope —too narrow grooves will pinch and distort the rope; with too wide grooves the rope will flatten from lack of support. Worn sheaves prevent proper seating and play hob with the best of rope. And sheaves need lubricating, too.

4. IT'S ALL HERE!

48 pages, packed with practical information on wire rope handling and care, based on the experience of thousands of rope users. Send for as many copies as you need and get them into the hands of your operating men. Make sure that they follow the suggestions it offers, faithfully and consistently, and your ropes will work better and last longer. Remember, every broken rope is a "break" for the enemy.

Excellay Preformed

INDISPENSABLE TO AMERICA'S WAR EFFORT — GOOD WIRE ROPE!

AMERICAN STEEL & WIRE COMPANY
Cleveland, Chicago and New York
COLUMBIA STEEL COMPANY
San Francisco
United States Steel Export Company, New York

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UNITED STATES STEEL

Greater Safety

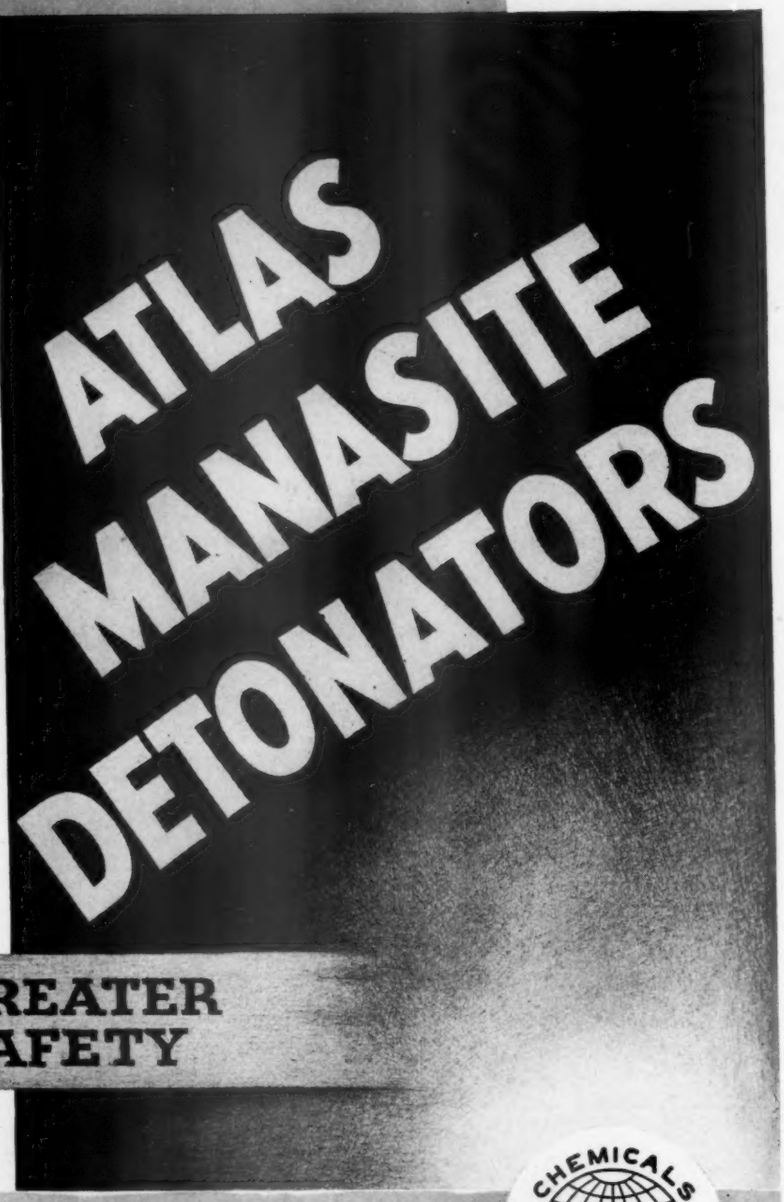
Always Important—Imperative Today!

ANYTHING that increases the effectiveness of America's production machine is vital today.

That's why the extra margin of safety provided by Atlas Manasite Detonators is more valuable than ever. By helping reduce avoidable accidents, Atlas Manasite Detonators help keep up production. They play a definite part in the cooperative effort needed to meet today's demands.

In addition to the safety factor, Atlas Manasite Detonators offer full dependability. The proof is in the figures: millions of Atlas Manasite Detonators have already been used. Furthermore, Atlas Manasite Detonators require no special methods of application—no special equipment. Nor do they cost any more.

Can you afford *not* to take advantage of this development for safer blasting practice?



for **GREATER SAFETY**

MANASITE—Reg. U S. Pat. Off.

ATLAS EXPLOSIVES

"Everything for Blasting"

CHEMICALS ATLAS EXPLOSIVES

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Here is Simple PROOF *of a* REAL SAVING in BELTS, in RUBBER, in POWER

What Happens When a V-Belt Bends

FIG. 1

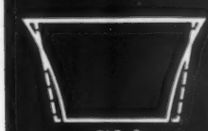

FIG. 2

In two minutes you can prove for yourself a simple fact that will lengthen belt wear and reduce operating costs.

Pick up any V-belt. Bend it as it bends when it goes around its pulley. As the belt bends, grip the sidewalls with your fingers. You will feel the *sides* of the belt *change shape.* If the belt has *straight* sides, the bending will force those sides to bulge out—as shown in Figure 1 (on the left).

Now make this same test with a belt that is built with the patented Concave side. Again you will feel the sides change shape but with this *important difference:*—the Concave side becomes perfectly straight. This belt, when bent, takes a shape that exactly fits its sheave groove. (See Figure 2).

Here are the savings. First—no out-bulge of the sides means uniform sidewall wear—a saving in belts for you, a saving in rubber for the Nation. Second—the full side of the belt uniformly grips the sheave wall. This means heavier loads without slippage—a saving in belt wear and also in power!

Only belts built by Gates are built with the Concave side, a Gates patent.

THE GATES RUBBER COMPANY

Engineering Offices and Stocks in All Large Industrial Centers

GATES VULCO ROPE DRIVES

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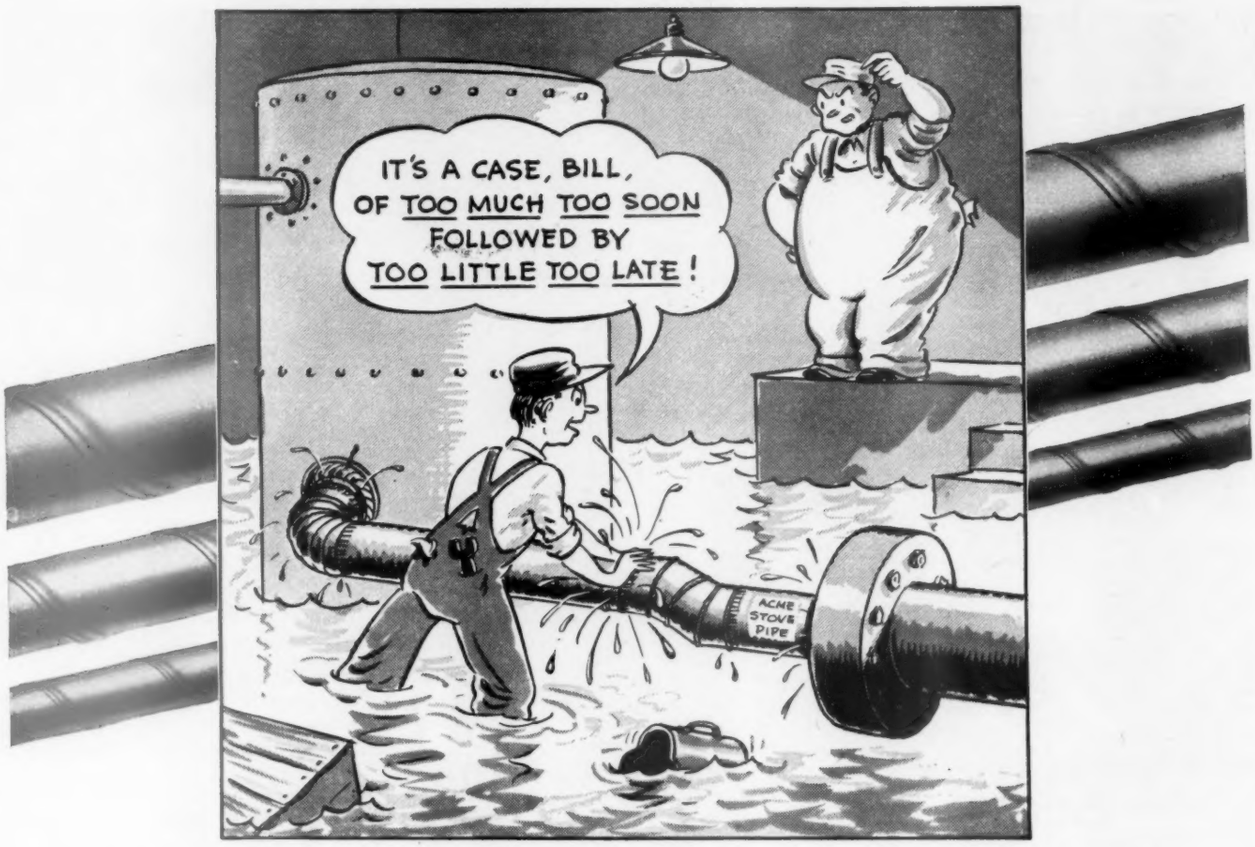
Denver, Colo. 999 South Broadway
Dallas, Tex. 2213 Griffin Street
Portland, Ore. 333 N. W. 5th Avenue
San Francisco, Cal. 2700 16th Street



Between these two extremes lies "Spiral"

THIS fetching incident illustrates the fact that in pipe, as in all things, it's a mighty good idea to strike a "happy medium".

If all industrial piping were carefully calculated for the job at hand there wouldn't be any stove pipe used of course . . . but by the same token there wouldn't be nearly as much standard thickness pipe used either.

No, if you figure it clear through, you'll find that for the wide range of services listed opposite the right selection is light, but remarkably strong Taylor Spiral Pipe—a pipe that can handle such requirements with strength and service life to spare—a pipe that in many cases can be installed at half the cost of the standard thickness pipe it replaces.

Taylor Spiral Pipe covers this broad range of piping needs supremely well. Thicknesses range from 18 to 6 gauge; sizes from 4" to 42"; joint lengths to 40 ft. All types of end joints and couplings are produced by Taylor Forge; all kinds of fittings and "specials" or fabricated assemblies—a complete service with undivided responsibility.

Particularly in recent years more and more pipe users have recognized the economy of using Taylor Spiral wherever it applies. But today it has still more than the saving of dollars to recommend it. Switching to Taylor Spiral now means conservation of vital steel. Why not consider it for that next job?

Change to TAYLOR SPIRAL PIPE FOR:

- High and Low Pressure Water Lines.
- Low Pressure Steam and Air Lines.
- Steam and Diesel Exhaust Lines.
- Vacuum and Suction Lines.
- Blower Piping.
- Sand and Gravel Lines.
- Industrial Gas Lines.
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- Spray Pond Piping.
- Hydraulic Mining.
- Dredge Lines.

TAYLOR FORGE & PIPE WORKS
General Offices & Works: Chicago, P. O. Box 485
New York Office: 50 Church Street
Philadelphia Office: Broad Street Station Bldg.

TAYLOR *Spiral* PIPE

Precious Power for the WAR EFFORT

Harnessing the turbulent waters of the Nation for industrial enterprise has proven to be a masterful stroke of ingenuity and foresight. Strategically located Grand Coulee, TVA, Boulder, Seminole, Bonneville, Fort Peck, and many other dams MARIONS helped to build are contributing tremendously in providing precious power for the war effort. Back of each of these vital power projects is the output of the Nation's quarries and cement plants, many of them employing MARION shovels to keep yardage requirements ahead of schedule.

THE MARION STEAM SHOVEL COMPANY
MARION, OHIO, U. S. A.

Offices in all principal cities

Serving industry since 1884

MARION

SHOVELS • DRAGLINES • CLAMSHELLS
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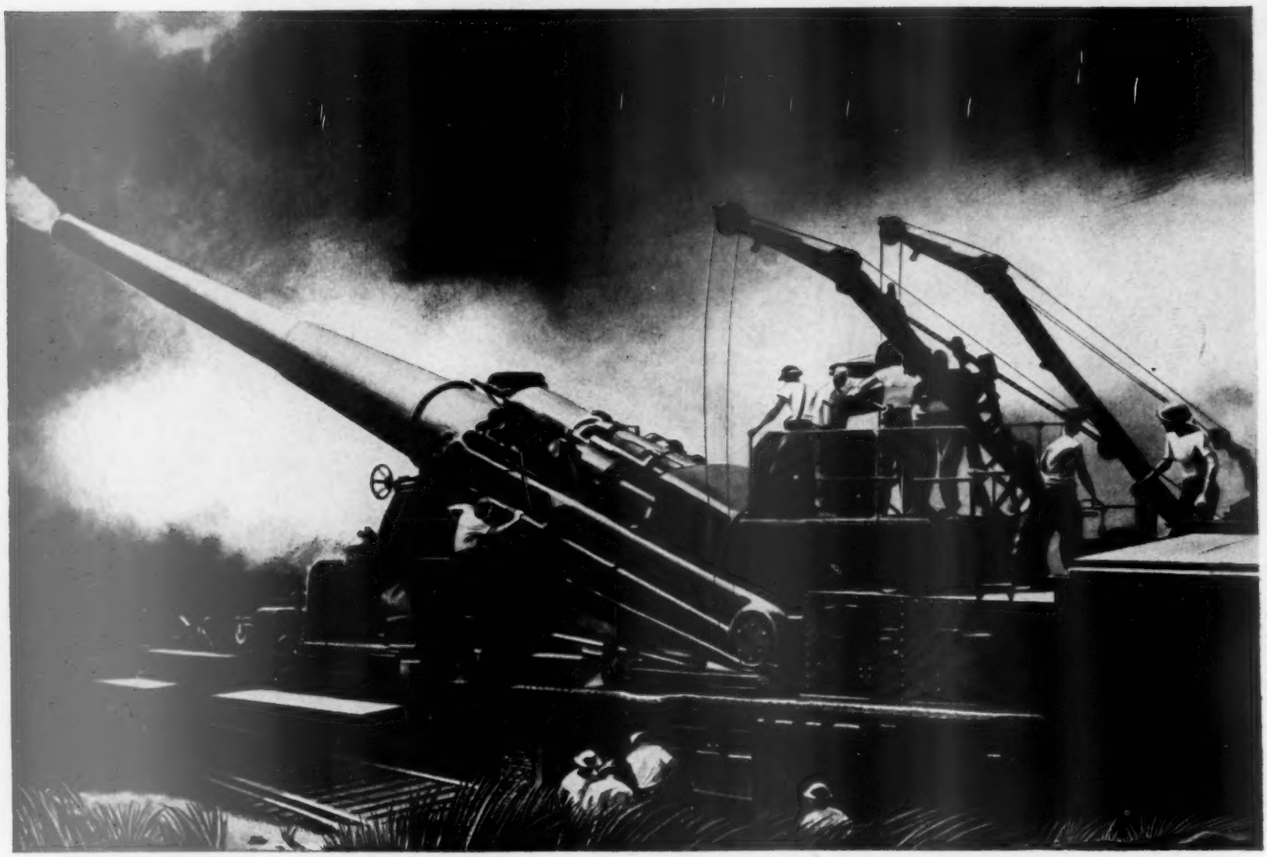
Gasoline — Diesel — Electric — ¾ cubic yard to 35 cubic yards



Feeding War Dogs

ANOTHER JOB FOR WICKWIRE ROPE

We'll be glad when it's over . . . when Wickwire rope can get back to the jobs of a world at peace.

The quickest way from here to there is for us, and for you, each day *now*, to put everything we have into winning.

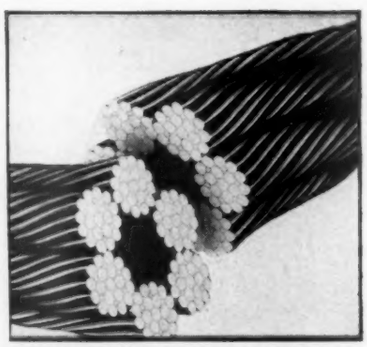
We are doing it by working day and night, seven days a week, on Wickwire Rope for our shipyards, our Liberty Fleet, the army, marine corps, coast guard and navy . . . and for industries whose production is so urgently needed.

You are contributing when you take care of your wire rope, making it last longer . . . so that there is more available for war needs.

But when you *must* have new wire rope, for war production or for essential services, ask your distributor for long-life *Wickwire* Rope. Both Wickwire regular lay and pre-formed Wissco Lay have quality that has made them famous for *low cost per year of use*. We put that into Wickwire rope by controlling every step from ore pile, through blast furnaces, open hearths, precision wire drawing, and skillful laying of the rope.

• • •

A FREE BOOK, "Know Your Ropes," is waiting here for you. More than 25,000 wire rope users all over the world consider this a bible on the selection of wire rope—*and making it last longer*. Write Wickwire Spencer Steel Company, 500 Fifth Ave., New York, N. Y.



REVERSE ROPE FOR LONGER LIFE
Frequently, most severe strain, due to close bending, occurs near one of the ends. Rope life is increased by exchanging the drum end with the load end. This and forty more rope life-savers are fully described in the free book, "Know Your Ropes."

SEND YOUR WIRE ROPE QUESTIONS TO WICKWIRE SPENCER

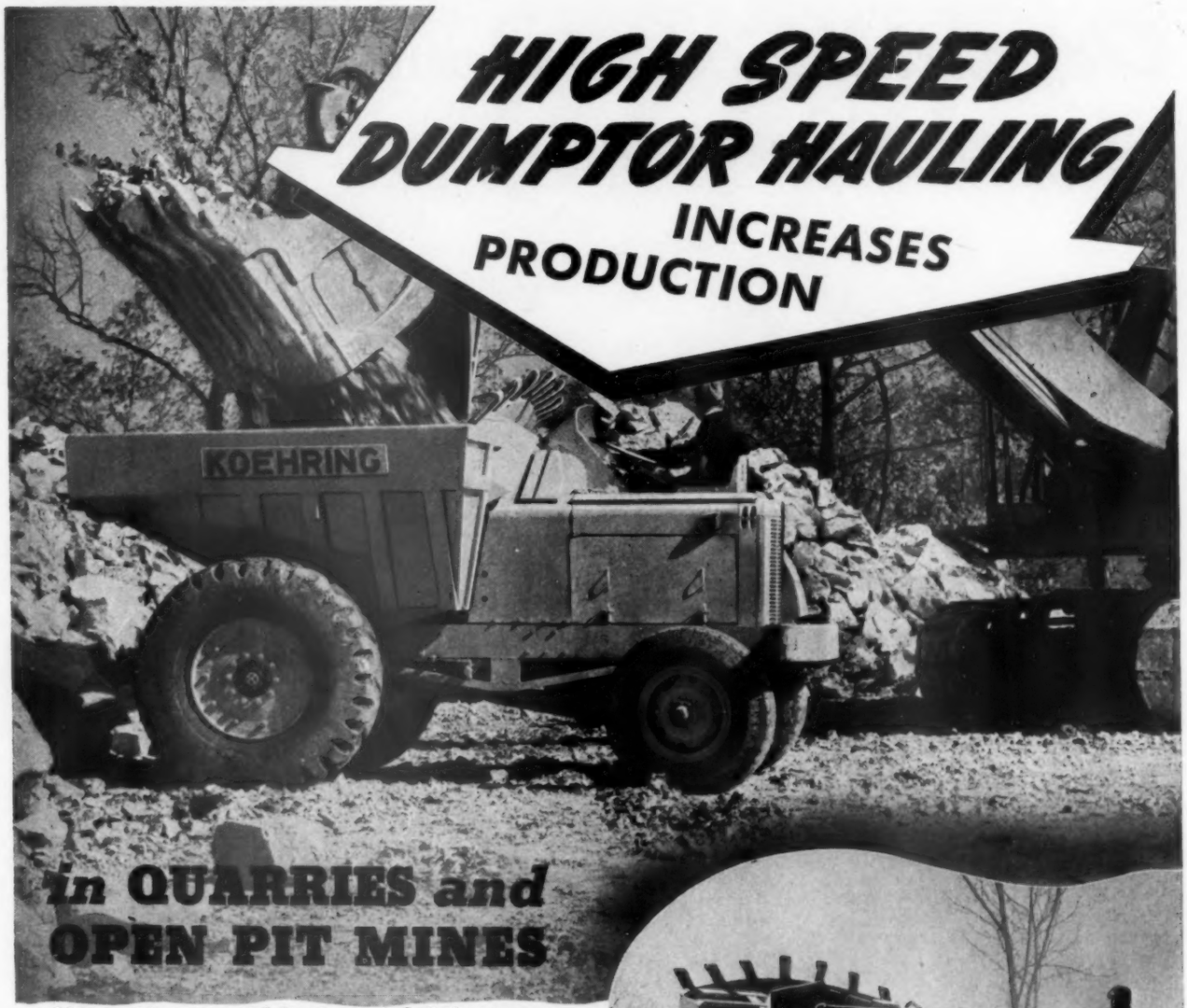
WICKWIRE SPENCER STEEL COMPANY

WICKWIRE ROPE

Sales Offices and Warehouses: Worcester, New York, Chicago, Buffalo, San Francisco, Los Angeles, Tulsa, Chattanooga, Houston, Abilene, Texas, Seattle. Export Sales Department: New York City

WISSCO PRODUCTS

HIGH SPEED DUMPTOR HAULING INCREASES PRODUCTION



in QUARRIES and OPEN PIT MINES

Now, when speed is essential, it is necessary to do the job in the shortest possible time. In quarries and open pit mines the Koehring Dumptor has been accepted as a high speed, dependable hauling unit. Important time-saving advantages are ***instantaneous*** dumping, three speeds, either forward or reverse, easy quick loading, G. M. Diesel power, constant mesh transmission. The Dumptor travels either way eliminating turns and backing. The Dumptor does not need to wait for body hoisting. It dumps by gravity, ***instantaneously.*** Seconds saved in every operation, increases daily production.

KOEHRING CO., *Milwaukee, Wis.*

Saves Seconds Every Trip

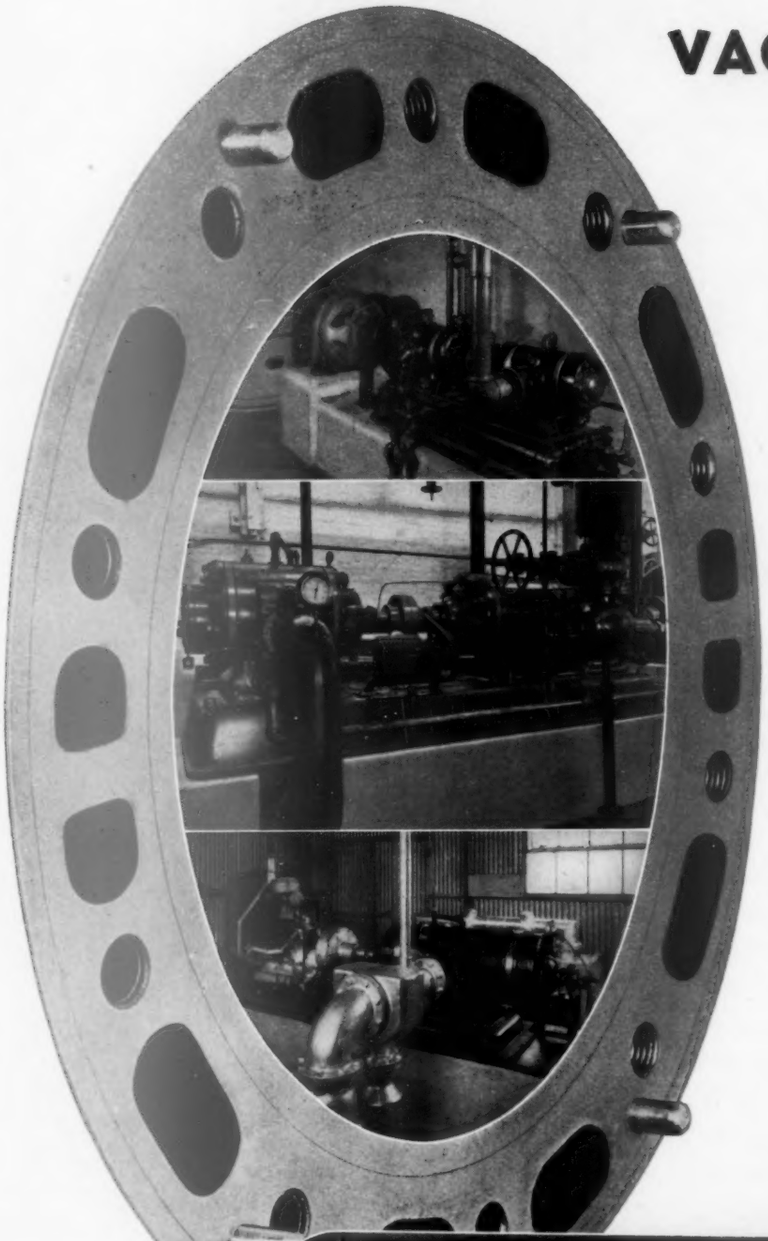
Koehring Dumptor dumps *Instantaneously* to cars, hopper, grizzly or fill.

KOEHRING HEAVY DUTY

HEAVY-DUTY CONSTRUCTION EQUIPMENT

Dependable, Economical Service

FULLER ROTARY COMPRESSORS AND VACUUM PUMPS



Fuller Rotary Compressors and Vacuum Pumps furnish such dependable and economical service, that of the hundreds now in operation, a great many have been installed on repeat orders.

Industry today is taking advantage of the development and refinements of the Fuller Rotary for general industrial use. Fuller engineers have spent years in developing this unit to its present-day standard. This has had its reward, as is attested to by the reliable and economical service provided the many owners of these machines.

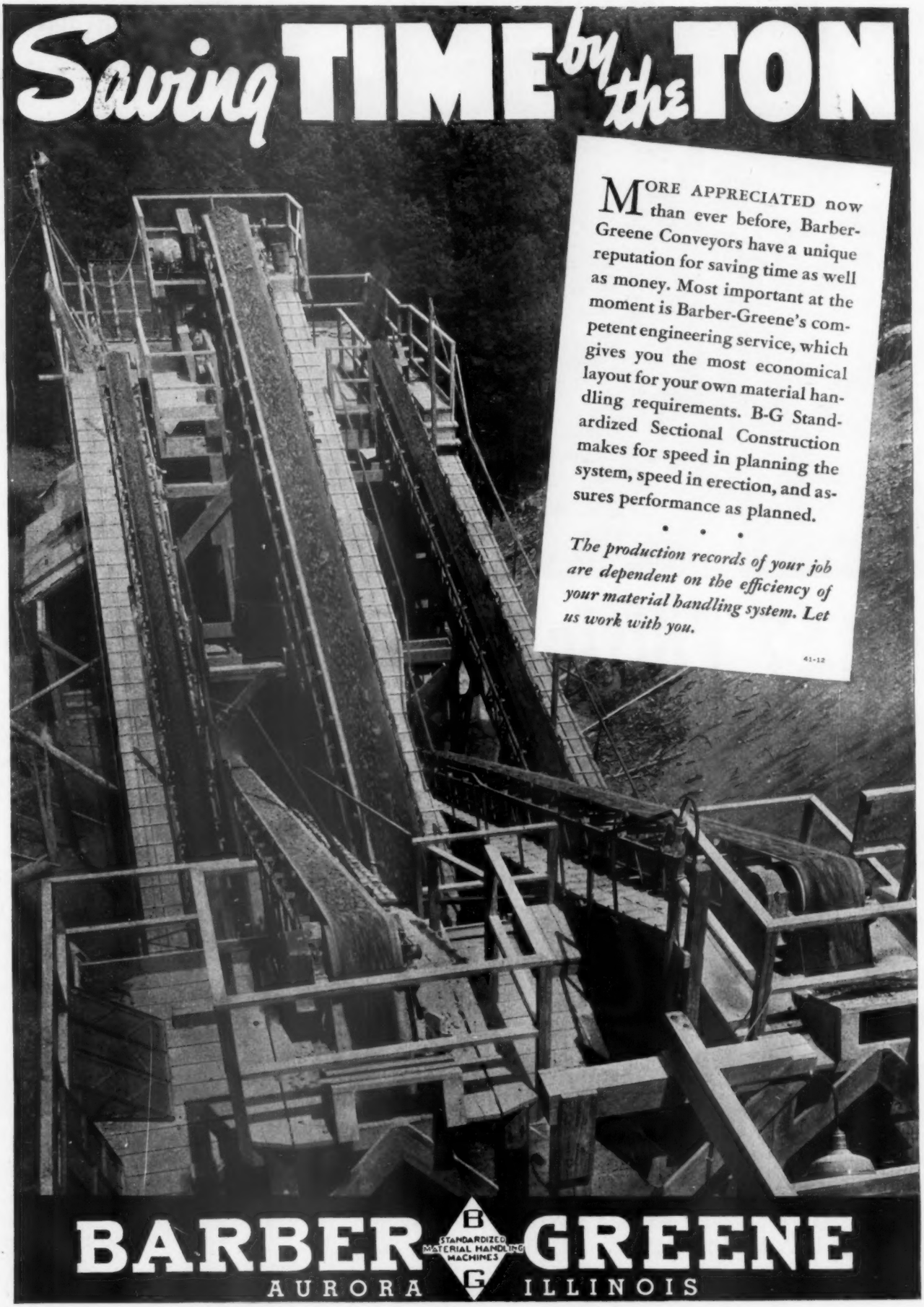
Simplicity makes for reliability and, one of the outstanding features of a Fuller is simplicity of design . . . only three moving parts —rotor, bearings, blades. Other features and advantages of Fuller Rotary Compressors and Vacuum Pumps are illustrated and described in Bulletin C-5. Write for a copy today.

FULLER COMPANY
CATASAUQUA, PENNSYLVANIA

Chicago: 1144 Marquette Bldg.
San Francisco: 320-321 Chancery Bldg.

C-64

Saving TIME by the TON



MORE APPRECIATED now than ever before, Barber-Greene Conveyors have a unique reputation for saving time as well as money. Most important at the moment is Barber-Greene's competent engineering service, which gives you the most economical layout for your own material handling requirements. B-G Standardized Sectional Construction makes for speed in planning the system, speed in erection, and assures performance as planned.

• • •

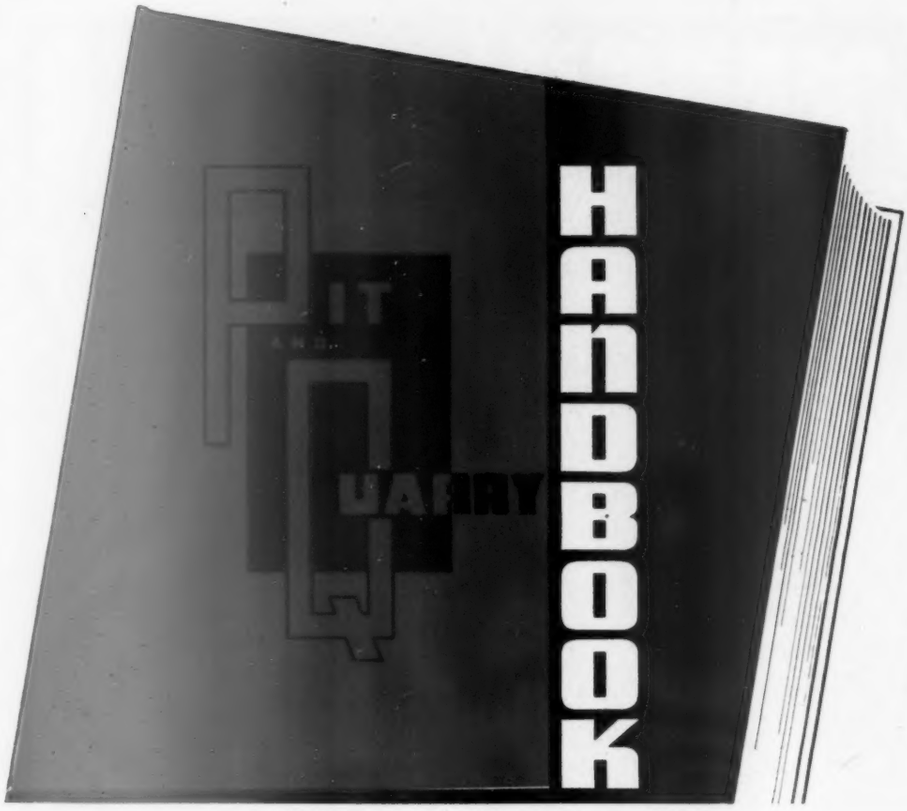
The production records of your job are dependent on the efficiency of your material handling system. Let us work with you.

41-12

BARBER GREENE

STANDARDIZED MATERIAL HANDLING MACHINES

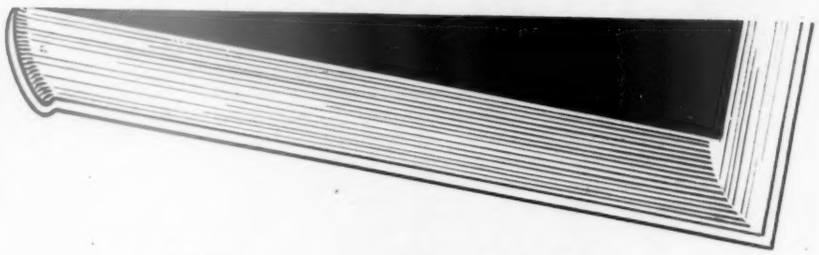
AURORA ILLINOIS



An Indispensable Tool For Both Operator and Supplier of Equipment

The pit-and-quarry industries, in providing important basic raw materials, bear a large responsibility for the success of America's war effort. For the operator, the revised Technical Section of the 1942 Handbook provides a ready answer for many of his operating problems. For the concern supplying him with the tools and machinery necessary to produce his materials, the 1942 Directory Section supplies an accurate, up-to-the-minute list of all known producers of nonmetallic minerals and their products. Each new listing has been carefully checked for accuracy. Previous listings have been revised and brought up to date. Inactive firms have been eliminated.

1942 Edition Now Available



Directory Section listings appear two ways—(1) alphabetical by companies, (2) geographical by plants. You get company names, officers, location of plants, size or capacity, and the names of the men who do the buying. Choose the complete Handbook and Directory . . . or the convenient, flexibly-bound Directory alone. Order NOW and get one of the first copies off the presses. Use the handy coupon below.

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- 83 CHAPTERS
- 15,000-NAME DIRECTORY, INCLUDING 1643 NEW NAMES
- AUTHORITATIVE

Pit and Quarry,
538 S. Clark St., Chicago, Ill.

Date .....

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Please send.....copies of the 1942 DIRECTORY ($10.00 per copy)

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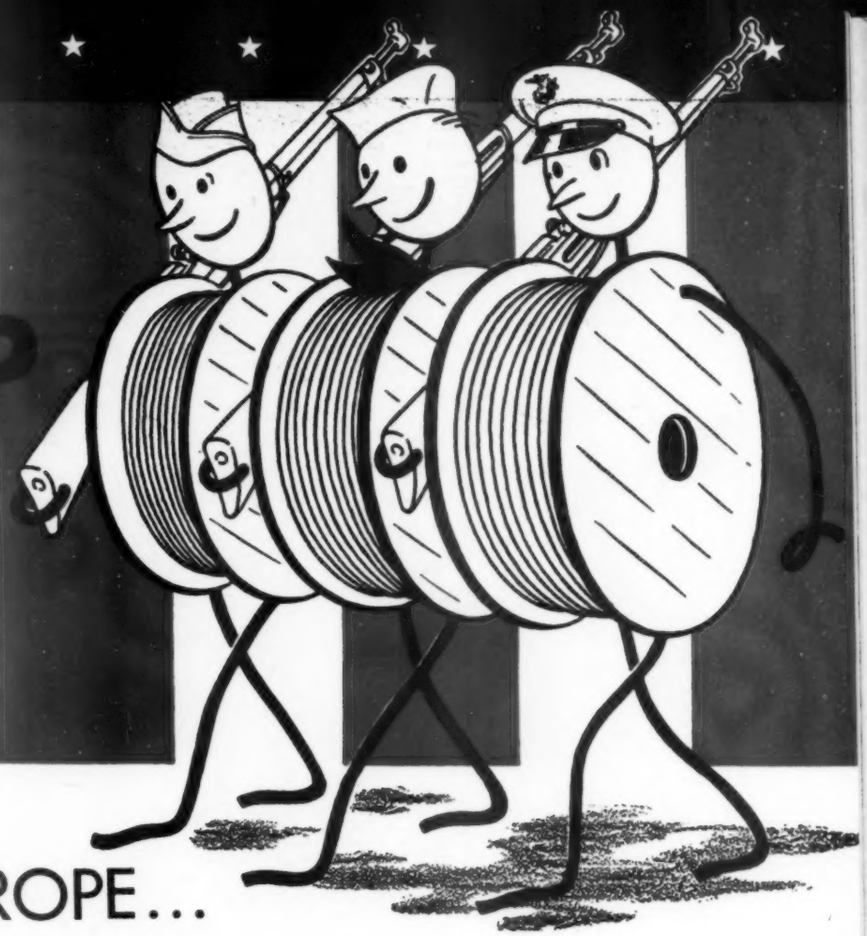

Conserve WIRE ROPE... Make It Serve You Better

The Navy, the Army and the Marines are doing their part to win this war quickly . . . but our fighting forces must have war materials, more of them—faster! It is up to everyone to practice rigid Economy with all critical materials . . . to save what we have and use what we have to better advantage. For this purpose, the following literature should be helpful to your organization in proper selection, handling and use of WIRE ROPE. This information will help SAVE Wire Rope, which is made of high-carbon steels by highly trained men, essential to many wartime industries.

Mail This Card NOW for Valuable Booklets

CHECK ON REVERSE SIDE OF CARD THE INFORMATION YOU NEED . . .

"ROPE DOPE"

Educational bulletins explaining Wire Rope selection, care and installation.

"CORRECT HANDLING OF WIRE ROPE"

This booklet shows the proper way to unreel and handle Wire Rope.

"SOCKETING WIRE ROPE"

The proper methods of socketing are explained and illustrated in this booklet.

"SPLICING WIRE ROPE"

This booklet gives information on the proper method of splicing.

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One of the three Union Wire Rope shifts working for Victory.

THE NAVY "E" for EXCELLENCE

The Union Wire Rope Corporation takes pride in announcing that it is now privileged to fly the Navy Department blue burgee, for outstanding performance in the production of naval material. To each member of Union Wire's personnel is awarded the official insignia, and the legend, "For Production."

LET'S ALL PULL TOGETHER FOR VICTORY

The War Production Board realizes the vital necessity of Wire Rope in the production of many products so essential to Victory, and is cooperating in every way possible with the Wire Rope industry. If you order more Wire Rope than you need for current use, you are defeating a good cause, but it is wise to give advance notice on requirements.

In ordering Wire Rope, give the manufacturer as detailed information as possible on the planned use of the rope. If the exact specifications are not available, the manufacturer, with your information, can make recommendations for the next best specification. You will be doing your part, patriotically, by seeing that every foot of rope is used to the best advantage.

It is necessary for the Wire Rope industry to maintain records showing the rank of priorities applying to its products, and it is required that you furnish the distributors or manufacturers of Wire Rope with proper priority ratings with your orders.

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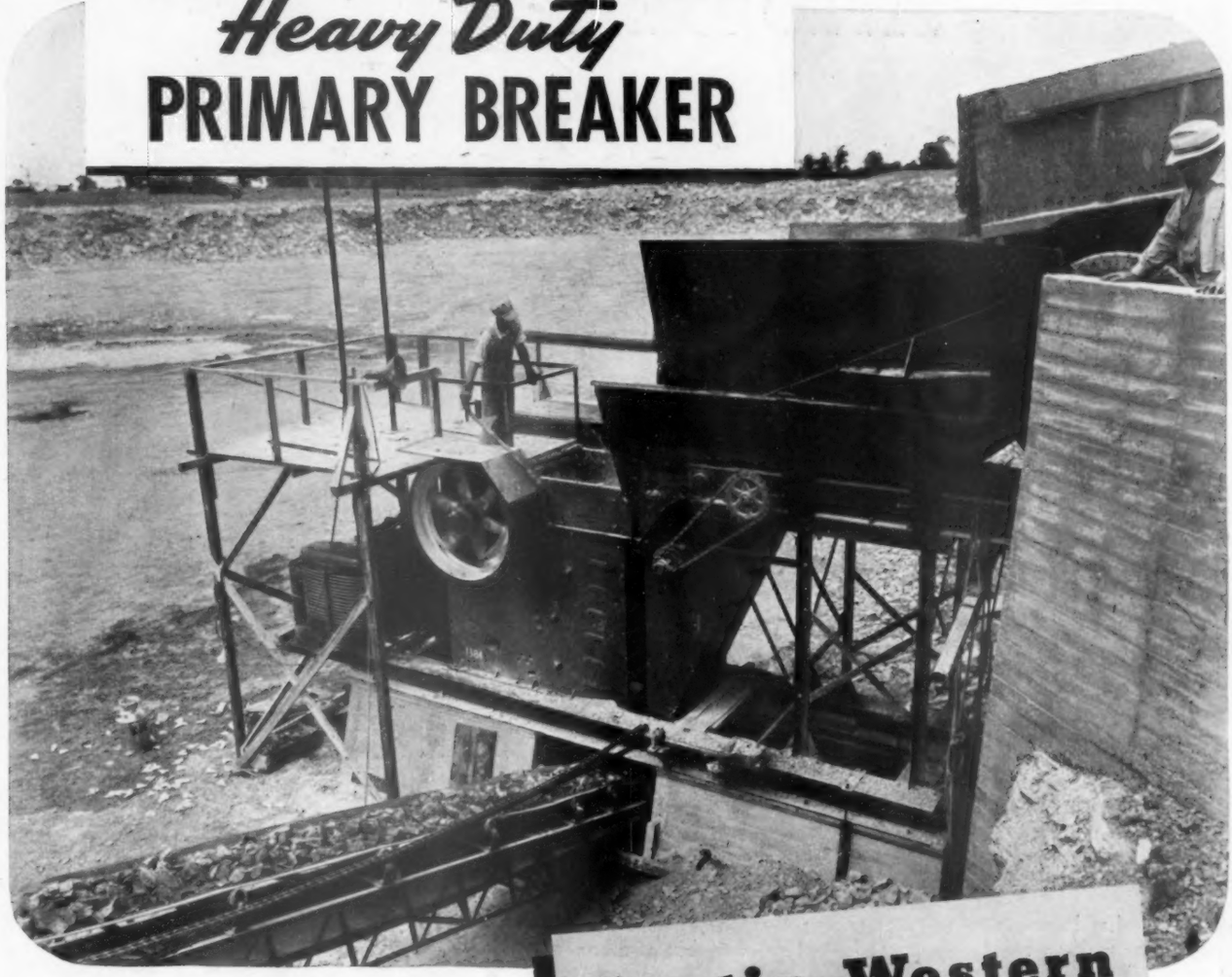
AUSTIN-WESTERN
Heavy Duty
PRIMARY BREAKER



Reduces 24" Rock to 3" Minus

● This 2450 Primary Breaker is in operation at a Mid-West quarry, crushing rock for a U. S. Ordnance Plant. Set to produce 4" material, and handling rock up to 24", this unit is delivering 150 to 175 tons of stone per hour on a 3-shift basis.

This latest addition to the A-W line of pit and quarry equipment is an overhead eccentric type crusher. Its eccentric action gives a force feed, which with the speed of operation, provides substantially increased capacity over bulldog or gyratory crushing equipment, as well as enabling it to handle up to 24" material.

Typical A-W heavy duty construction features give assurance of continued high efficiency, low maintenance cost, and extra years of trouble-free service. Jaws are exceptionally deep to provide faster crushing. Shafts are very large, and are equipped with self-aligning roller bearings which require lubrication only after ten hours of operation.

The crusher is equally suitable for use in a stationary set-up or in a portable unit. The breaker weighs 34,000 pounds, and is driven by a 100 H. P. motor. Wheels can be with steel or pneumatic tires. Write for full details.

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ROLL-A-PLANES • MOTOR SWEEPERS • SHOVELS AND CRANES • SCARIFIERS • DUMP CARS • TRAIL CARS

KENNEDY STONE PREHEATER AND DEHEATER

Saves in Lime Production

40% SAVINGS IN FUEL
20% INCREASE IN CAPACITY

Plus
A Better Product!

It has been known for many years that better lime could be made in rotary kilns than in vertical kilns, but at a considerable handicap in price.

The great length of former types of rotary kilns, sometimes exceeding 400 feet, has failed to solve the problem of efficiently reducing the temperature of the exit gases.

Now, thanks to the KENNEDY principle of preheating and deheating, it is possible to make a high-grade lime of better quality than was formerly obtainable in long or short kilns at greatly reduced cost of production.

This principle permits the effective recovery and use of the exit gases, and in actual operation has shown 40% saving in fuel, with capacity increased 20% and more.

Short kilns employing the KENNEDY method also acquire an internal glaze which lessens the wear on kiln liners, lowers the power requirements, and reduces the formation of kiln rings.

Overburned and underburned lime is practically eliminated. Coal feed and lime calcination are switchboard controlled.

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THE pressure is on us—it's on you for output. Any device that is going to enable you to get ore to the mill in bigger quantities, faster, means something to you and to the country.

Northwest realized long ago that hard operation reduced a machine's output as the day progressed—and the result was the "feather-touch" Clutch Control. This device turns the power of the engine to actuate the heavy drum clutches. It is purely mechanical. There is nothing to leak, no high pressure lines, no complicated adjustments, it is unaffected by weather,—just a simple band mechanism so sensitive that the feel of the bucket is always present. Release is positive and if desired it can be disconnected so there is no possibility of shut down due to failure of controls.

The "feather-touch" Control reduces operator fatigue and permits the maintenance of high output *all day long.*

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1822 Steger Building, 28 East Jackson Boulevard, Chicago, Illinois

It's a real hard rock miner!

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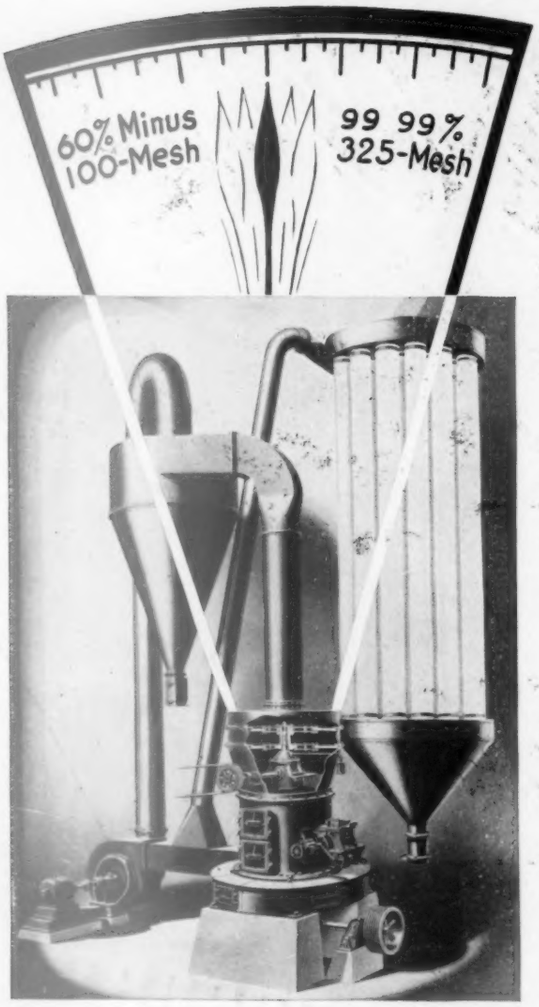

WIDE RANGE FINENESS CONTROL

with....

RAYMOND
Double Whizzer Type
ROLLER MILL

Custom Grinding.....

Improve your mill output
by
installing a
Whizzer Type
Separator
on your
present
Roller Mill

Ask for details

If you have a special problem in drying and grinding, write us for information.

Where you need to make quick changes in classification . . . as in pulverizing different products or making various grades of material in the same mill . . . you can get close fineness control within wide limits by the use of the RAYMOND Double Whizzer Type ROLLER MILL.

All the way from 60% minus 100-mesh up to 99.99% through 325-mesh . . . simply by shifting a hand lever on the variable speed control unit, which regulates the fineness by changing the whizzer speed.

This modern equipment is economically adapted to the grinding of gypsum, limestone screenings, clay, talc, kaolin, bauxite, barytes, pigments and chemicals.

Products with surface moisture may be dried and pulverized in one operation by introducing heated air into the mill. Another optional feature is a throw-out attachment for rejecting impurities where high purity is desired.

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1321 North Branch Street, CHICAGO
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PIT AND QUARRY

Vol. 35 AUGUST, 1942 No. 2

CONTENTS

News of the Industry 25
The Victory Program . . . and Your Business 31
Editorial: "Rugged Individualism" Will Not Win the War 37
Slurry Filters, Other Improvements Modernize Medusa's Plant at Silica 38
Crude Silica-Sand Output Doubled to Meet War Demands of Foundries 41
Operating Views as Caught by the Camera 44
Magnesia Sources and the Magnesium-Metal Problem 45
Big Rock Stone Company Profits from Extensive Use of Welding 49
Develops Special Blasting Technique to Produce Well-Shattered Granite 51
ASTM Devotes Discussions to Concrete and Its Ingredients 55
Lime Association's Research Program Broadens Demand for Makers' Product 57
Increases Output to 150 Tons Hourly . . . 62
Barges Transport Material from Island Pit to New Illinois Gravel Plant 63
Adds Third Concrete-Pipe Machine to Cope With War-Construction Demand 77
Modern Handling Methods Save Labor at New Block Plant in Pennsylvania . . . 79

Personal Mention 65
Occupational Diseases and the Law . . . 67
Labor Decisions 68
Traffic News Digest 71
New Machinery and Supplies 73

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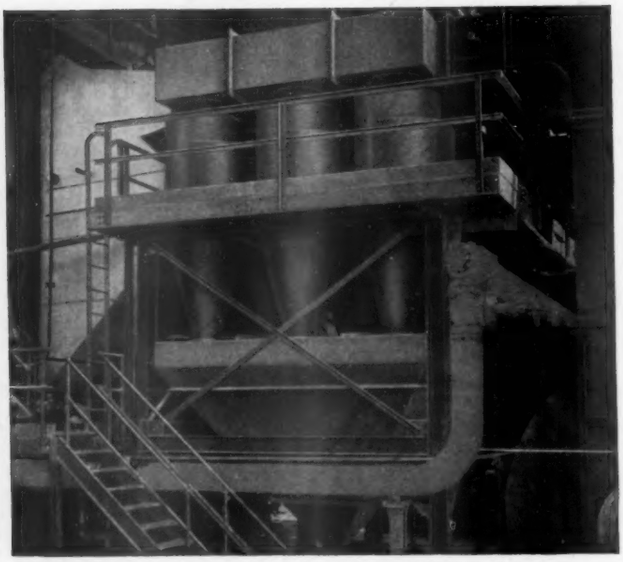

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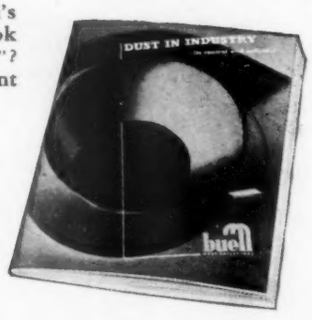
B *High efficiency*

C *Low operating cost*

Have you read Buell's new 24-page book "DUST IN INDUSTRY"? A copy will be sent upon request.



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PIT AND QUARRY

CHICAGO AUGUST, 1942

Illinois Minerals Meeting Cancelled Because of the War

Dr. M. M. Leighton, chief of the Illinois State Geological Survey, announces the cancellation of the Illinois Mineral Industries Conference, scheduled for Urbana, Illinois, October 30 and 31, 1942, under the joint sponsorship of the Illinois Mineral Industries Committee, the Engineering Experiment Station of the University of Illinois, and the State Geological Survey.

The sponsors have agreed to lend their combined support to the Regional Conference of the American Institute of Mining and Metalurgical Engineers, to be held in St. Louis, on October 1 and 2.

According to Dr. Leighton, who is a member of the general committee for the Regional Conference, the St. Louis meeting will stress current conditions and problems of the mineral industries of the entire Mississippi Valley area, with particular reference to the war needs, and the purpose of the Illinois Conference, as originally planned, will be adequately met.

The war situation and the need for coördination of all industrial and research effort make it desirable to concentrate time and effort on the one meeting.

Georgia Plant Manager Electrocuted on Dredge

J. W. Herman, 53, production manager of the Atlanta Sand & Supply Company's branch at Gaillaird, near Roberta, Georgia, was found dead June 23 on the floor of an electrically-operated dredge at the company's pit there.

Belief that Mr. Herman was electrocuted when he walked barefoot onto the floor of the dredge to start the pump was expressed by M. A. Jameson, head of the company's Gaillaird branch.

A resident of Atlanta, he is survived by his widow, one son, a daughter, and several brothers and sisters.

Leaves Stock in Sand Company to Employees

The will of the late Burdette Tomlin, president of the New Jersey Silica Sand Company named 40 employees of the company as the chief beneficiaries of his $500,000 estate.

Each is expected to receive about $10,000 worth of stock in the company, the total representing a majority interest.

Dolese & Shepard to Pay August Dividend

The directors of Dolese & Shepard Company at their regular meeting held July 15, declared a dividend of $1.00 per share, payable August 1 to stockholders as of July 20, 1942.

Coming Events

January 25-27, 1943—Cleveland, Ohio. Annual convention, National Crushed Stone Association, Hollenden Hotel. (No machinery exhibit.)

January 27-29, 1943—Cleveland, Ohio. Annual convention, National Sand & Gravel Association, Statler Hotel. (No machinery exhibit.)

January 27-29, 1943—Cleveland, Ohio. Annual convention, National Ready Mixed Concrete Association, Statler Hotel. (No machinery exhibit.)

Arms-Plant Fraud Suit Dismissed for Lack of Evidence

An informer's suit against the Fruco Construction Company and six other concerns, charging that the government was defrauded in construction of a $100,000,000 small-arms ammunition plant at St. Louis was dismissed without prejudice by United States District Judge John Caskie Collet, after Charles M. Hay, attorney for the informer, David Houlle, a former gravel salesman, stated to the court that he had been unable to obtain evidence in support of the charges.

"In the last few weeks," Mr. Hay said to the court, "I have made an investigation of my own, and I am forced to say I have come to the conclusion that the charges made by the informer are not sustained by the evidence I have been able to secure. I do not mean that the informer was not sincere in making the charges.

John J. Ruddy, special attorney for the war frauds section of the Attorney General's office, requested the court to defer dismissal for at least 30 days, pending completion of a Department of Justice investigation. Jacob M. Lashly, attorney for the Fruco firm, protested against prolongation of the case.

Defendants in the suit were the Fruco Construction Company, Fruin-Colnon Contracting Company, Columbia Quarry Company, Big Bend Quarry Company, Fred Schmitt Material Company, Missouri - Illinois Material Company and Arrow Trucking Company. (*P&Q*, February, 1942, page 21.)

A provision of the Federal law allows the filing of an informer's suit by any citizen, who shall be entitled to one-half of any damages recovered, plus one-half of a $2,000 statutory fine if assessed.

June Building Hits All-Time Record as Tempo of War Rises

All previous construction records were broken in June, according to the F. W. Dodge Corporation. Building and engineering contracts awarded in the 37 eastern states amounted to $1,190,264,000. This was nearly 57 per cent more than the dollar volume of August 1941, $760,233,000, the previous all-time high. Comparisons of these two record months indicate roughly the impact of the war on the construction program: industrial-building contracts in June, 1942, were double the dollar volume of last August; heavy engineering construction nearly doubled; non-residential building, other than commercial and industrial work, increased three-fold. On the other hand, commercial building contracts last month were a third less in dollar volume than in August of last year, and residential building was down 20 percent. Last month's total was a little more than double that of June, 1941.

The June, 1942, contract volume brought the total for the first half of the year up to $3,723,725,000, again a record-breaking figure, no previous year having produced so large a contract total in the first six months. The increase over the first half of 1941 was 46 per cent.

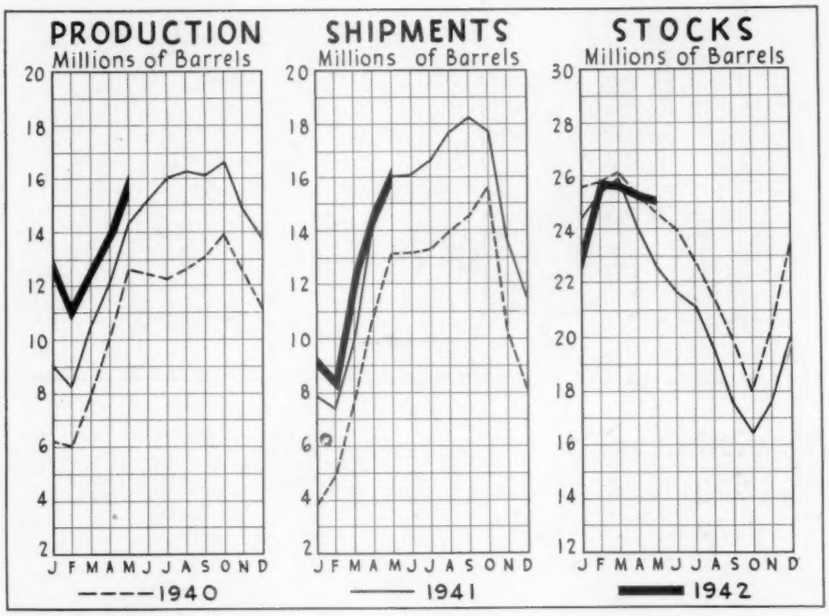
More detailed comparisons of the first half of 1942 with the first half of 1941 are as follows: industrial buildings, up 86 per cent.; commercial buildings, down 13 per cent.; all other non-residential buildings (including many for a wide variety of military purposes), up 102 per cent.; residential building (including principally barracks and housing for war workers in industry), up 4 per cent.; heavy engineering construction (public works and utilities), up 73 per cent.

Paid Circulation of Pit & Quarry Among Nonmetallic - Mineral Producers in Recent Years:

1941	(November)	6,179
	(May)	5,945
1940	(November)	5,397
	(May)	5,037
1939	(November)	4,641
	(May)	4,617
1938	(November)	4,496
	(May)	4,366
1937	(November)	3,971
	(May)	3,772
1936	(November)	3,654

CONTINUOUSLY FOR 25 YEARS THE LARGEST PRODUCER CIRCULATION IN THE FIELD

69% increase in 5 Years



The Portland-cement industry in May, 1942, produced 16,119,000 barrels, shipped 16,349,000 barrels from the mills, and had in stock at the end of the month 24,882,000 barrels of cement, according to the Bureau of Mines. Production and shipments in May, 1942 showed increases of 9.4 and 1.9 per cent., respectively, as compared with May, 1941. Portland-cement stocks at mills were 9.4 per cent. higher than a year ago.

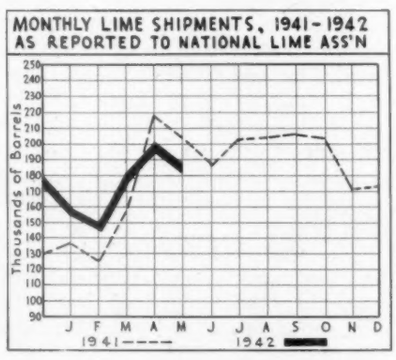
Feldspar Useful as Bomb Extinguisher

A cheap and easily obtainable material effective in extinguishing magnesium incendiary bombs has been found by the Geological Survey in feldspar, Secretary of the Interior Harold L. Ickes has announced.

Because the problem of handling incendiaries may become of common concern, the Geological Survey sought a solution which would involve the least expenditure for equipment or material supplies, and yet be as nearly foolproof as possible in handling. In the use of feldspar, ground to pass a 10-mesh screen and be retained by a 200-mesh screen, Geologist W. W. Rubey and Chemists Michael Fleischer and J. J. Fahey believe they have found an effective answer. The effectiveness of this material has been demonstrated on a small scale in the Geological Survey laboratories, and on one-pound bombs at Edgewood Arsenal of the Chemical Warfare Service.

In order to protect the public interest and to prevent exploitation of the method, the Department of the Interior by arrangement with the inventors acting through the Department of Justice has taken steps to obtain government-controlled patent protection for the invention. Under the patent, the Department will make the process and use of the material available to any commercial concern. Commercial development of the material will be encouraged by the Department of the Interior, but Government control of the patent will protect the public against exploitation.

The North American Cement Corporation, New York, has moved its offices to 41 East 42d street.



According to data collected by the National Lime Association, 70 companies in May, 1942, shipped 182,736 tons of lime (116,695 quicklime; 66,041 hydrate). Reporting companies represent 47.3 per cent. of the association's total capacity of record. Based on PIT AND QUARRY'S estimates for the remainder of the industry, the total shipments for the month by all plants were approximately 450,000 tons. Shipments of lime by users for May, 1942, were:

Use	Quicklime (tons)	Hydrate (tons)
Agricultural	3,738	19,069
Building	12,672	27,359
Chemical	100,285	19,613
Total	116,695	66,041

Rail Shipments of Aggregates to Gain 11% in 3rd Quarter

An increase of 10.9 per cent. in carloadings of gravel, sand and stone in the third quarter of the current year over the corresponding 1941 period is forecast by estimates com-

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considerable amount of discarded wire rope as guard-rail rope and for other purposes. This situation has led, in some cases, to a neglect of the fundamentals of rope selection and care, because, it is argued, why pay the premium for long-life rope and put up with the additional expense and trouble of proper rope and sheave maintenance when the old rope can be used in other ways as fast as it wears out?

This line of reasoning is as fallacious as to say that an automobile owner should buy cheap tires and neglect keeping them inflated so that his children might have plenty of patched inner tubes to float around on in the lake. Both arguments employ the same line of reasoning.

The fact should not be overlooked that it is expensive to use a rope designed for operation over drums and sheaves in applications where a low-priced wire strand will serve the purpose, especially if the serviceability of the rope as an operating part of a machine can be increased further by proper rope selection and reasonable care.

To illustrate, suppose a quarry has chased at, say, 25 cents per foot. Since only six ropes will now be used in a year's time, instead of 12 as with ordinary rope, the total length used will be 480 feet, and there will be required 480 additional feet of strand to make up for the deficiency in old rope. The total cost is now $120 for the rope and $24 for the strand, or a total of $144.

Hence, the total rope and strand cost in the latter case is $48 less than the cost of the rope alone by the former method. (See table.)

If savings can be made by increasing rope life through the use of fatigue-resisting rope, one can expect that the longer rope life resulting from better maintenance of the rope and sheaves would also bring about substantial savings.

COMPARISON BETWEEN THE COST OF ORDINARY AND LONG-LIFE ROPE ASSUMING THAT ALL DISCARDED ROPE MAY BE UTILIZED

	Use Ordinary Rope	Use Preformed Rope Together with Single Strand
Length of each rope	80 feet	80 feet
Average life of each rope	1 month	2 months
Number of ropes discarded in year	12	6
Total length of ropes discarded	12 × 80 = 960 feet	6 × 80 = 480 feet
Total length of strand required	none	960 — 480 = 480 ft.
Cost per foot of rope	20 cents	25 cents
Cost per foot of strand		5 cents
Cost of rope	960 × 20c = $192	480 × 25c = $120
Cost of strand		480 × 5c = $24
Total cost of rope and strand	$192	$144

Amount saved in year by using preformed rope and steel strand = $192 — $144 = $48.

Where there is any question about the advisability of selecting ropes on the basis of cost only, and neglecting their care, simply because discarded ropes find a ready use, the answer can be obtained by computing the total cost and comparing it with the cost where rope selection and maintenance are given proper attention. Such a comparison will show in most cases that it is economical to keep ropes in service as long as practicable, regardless of the use to which the discarded ropes can be put.

Critical Materials for War Use Exclusively

In a move to make all possible material and effort available for immediate war production, officials of the War Production Board and the War and Navy Departments have established broad principles governing all war-time construction which will bring such building under more rigid conservation control.

The program means that no new plants can be built unless they are absolutely essential to the war effort. This applies not only to direct war plants but to all other construction, both publicly and privately financed.

One of the main reasons for the new policy is that all critical materials are needed for war production now, and none can be spared for building new facilities except when they are absolutely necessary. The policy means simply that in the light of existing shortages, it is necessary to put materials and effort into planes, ships, tanks, and guns now, rather than putting them into plants which would not produce fighting weapons until a much later date.

Nevada's Magnesite Resources Utilized

Magnesite production is expanding rapidly in the Mammoth District approximately thirty-five miles northeast of Luning, Nevada.

The Basic Magnesium Company is taking ore from the two quarries, from two to three carloads of magnesite are shipped daily to California magnesium plants from holdings of the Permanente Corporation and the Westvaco Chlorine Products Company, and the Standard Slag Company is preparing to resume diamond drilling of 120 acres in the field.

Richard L. Smith, consulting engineer for the Standard Slag Company of Youngstown, Ohio, reports equipment for the new explorative campaign is now on the site.

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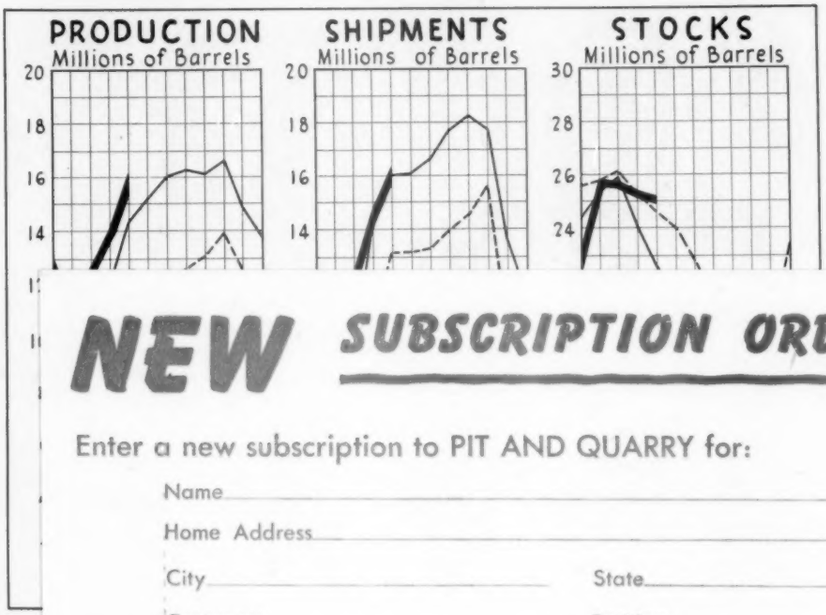
1936	(November)	3,654

69% increase In 5 Years



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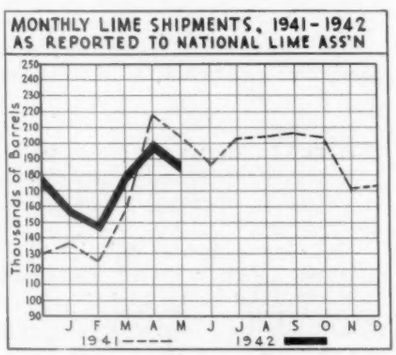
BM2

nesium incendiary bombs has been found by the Geological Survey in feldspar, Secretary of the Interior Harold L. Ickes has announced.

Because the problem of handling incendiaries may become of common concern, the Geological Survey sought a solution which would involve the least expenditure for equipment or material supplies, and yet be as nearly foolproof as possible in handling. In the use of feldspar, ground to pass a 10-mesh screen and be retained by a 200-mesh screen, Geologist W. W. Rubey and Chemists Michael Fleischer and J. J. Fahey believe they have found an effective answer. The effectiveness of this material has been demonstrated on a small scale in the Geological Survey laboratories, and on one-pound bombs at Edgewood Arsenal of the Chemical Warfare Service.

In order to protect the public interest and to prevent exploitation of the method, the Department of the Interior by arrangement with the inventors acting through the Department of Justice has taken steps to obtain government-controlled patent protection for the invention. Under the patent, the Department will make the process and use of the material available to any commercial exploitation.

The North American Cement Corporation, New York, has moved its offices to 41 East 42d street.



According to data collected by the National Lime Association, 70 companies in May, 1942, shipped 182,736 tons of lime (116,695 quicklime; 66,041 hydrate). Reporting companies represent 47.3 per cent. of the association's total capacity of record. Based on PIT AND QUARRY'S estimates for the remainder of the industry, the total shipments for the month by all plants were approximately 450,000 tons. Shipments of lime by users for May, 1942, were:

Use	Quicklime (tons)	Hydrate (tons)
Agricultural	3,738	19,069
Building	12,672	27,359
Chemical	100,285	19,613
Total	116,695	66,041

Rail Shipments of Aggregates to Gain 11% in 3rd Quarter

An increase of 10.9 per cent. in carloadings of gravel, sand and stone in the third quarter of the current year over the corresponding 1941 period is forecast by estimates compiled by the 13 Regional Shippers' Advisory Boards.

It is estimated that loadings of gravel, sand and stone will total quarter, compared with 530,100 in 587,731 cars during this year's third the same period a year ago.

Third-quarter carloadings of cement are expected to increase 7.1 per cent. over a year ago, increasing from 206,603 to 221,328, while a decrease of 3.2 per cent. is forecasted for carloadings of lime and plaster, which are expected to fall off from 52,417 in last year's third quarter to 50,735 this year.

Preformed Rope Costly for Guard-Rail Use

By F. L. SPANGLER

Many quarries are able to use a considerable amount of discarded wire rope as guard-rail rope and for other purposes. This situation has led, in some cases, to a neglect of the fundamentals of rope selection and care, because, it is argued, why pay the premium for long-life rope and put up with the additional expense and trouble of proper rope and sheave maintenance when the old rope can be used in other ways as fast as it wears out?

This line of reasoning is as fallacious as to say that an automobile owner should buy cheap tires and neglect keeping them inflated so that his children might have plenty of patched inner tubes to float around on in the lake. Both arguments employ the same line of reasoning.

The fact should not be overlooked that it is expensive to use a rope designed for operation over drums and sheaves in applications where a low-priced wire strand will serve the purpose, especially if the serviceability of the rope as an operating part of a machine can be increased further by proper rope selection and reasonable care.

To illustrate, suppose a quarry has a shovel with an 80-foot hoist cable, which must be replaced every month because the small drum and sheaves and the severe operating conditions cause the rope to fatigue rapidly. The rope costs, say, 20 cents per foot, and each rope, as it is replaced, is used somewhere about the quarry for a purpose where a smaller-diameter 7-wire strand, priced at 5c per foot, would serve admirably. The total cost of the 12 ropes purchased in a year's time would be $192.

Now, suppose it is decided to use a fatigue-resisting rope on the shovel in order to obtain longer rope life, and that single-strand will be used to make up for the shortage in discarded rope. Since records show that performed rope used in severe service will average at least double the life of ordinary rope, let us suppose that preformed rope is purchased at, say, 25 cents per foot. Since only six ropes will now be used in a year's time, instead of 12 as with ordinary rope, the total length used will be 480 feet, and there will be required 480 additional feet of strand to make up for the deficiency in old rope. The total cost is now $120 for the rope and $24 for the strand, or a total of $144.

Hence, the total rope and strand cost in the latter case is $48 less than the cost of the rope alone by the former method. (See table.)

If savings can be made by increasing rope life through the use of fatigue-resisting rope, one can expect that the longer rope life resulting from better maintenance of the rope and sheaves would also bring about substantial savings.

Where there is any question about the advisability of selecting ropes on the basis of cost only, and neglecting their care, simply because discarded ropes find a ready use, the answer can be obtained by computing the total cost and comparing it with the cost where rope selection and maintenance are given proper attention. Such a comparison will show in most cases that it is economical to keep ropes in service as long as practicable, regardless of the use to which the discarded ropes can be put.

COMPARISON BETWEEN THE COST OF ORDINARY AND LONG-LIFE ROPE ASSUMING THAT ALL DISCARDED ROPE MAY BE UTILIZED

	Use Ordinary Rope	Use Preformed Rope Together with Single Strand
Length of each rope	80 feet	80 feet
Average life of each rope	1 month	2 months
Number of ropes discarded in year	12	6
Total length of ropes discarded	12 × 80 = 960 feet	6 × 80 = 480 feet
Total length of strand required	none	960 — 480 = 480 ft.
Cost per foot of rope	20 cents	25 cents
Cost per foot of strand	.....	5 cents
Cost of rope	960 × 20c = $192	480 × 25c = $120
Cost of strand	.....	480 × 5c = $24
Total cost of rope and strand	$192	$144

Amount saved in year by using preformed rope and steel strand = $192 — $144 = $48.

Critical Materials for War Use Exclusively

In a move to make all possible material and effort available for immediate war production, officials of the War Production Board and the War and Navy Departments have established broad principles governing all war-time construction which will bring such building under more rigid conservation control.

The program means that no new plants can be built unless they are absolutely essential to the war effort. This applies not only to direct war plants but to all other construction, both publicly and privately financed.

One of the main reasons for the new policy is that all critical materials are needed for war production now, and none can be spared for building new facilities except when they are absolutely necessary. The policy means simply that in the light of existing shortages, it is necessary to put materials and effort into planes, ships, tanks, and guns now, rather than putting them into plants which would not produce fighting weapons until a much later date.

Nevada's Magnesite Resources Utilized

Magnesite production is expanding rapidly in the Mammoth District approximately thirty-five miles northeast of Luning, Nevada.

The Basic Magnesium Company is taking ore from the two quarries, from two to three carloads of magnesite are shipped daily to California magnesium plants from holdings of the Permanente Corporation and the Westvaco Chlorine Products Company, and the Standard Slag Company is preparing to resume diamond drilling of 120 acres in the field.

Richard L. Smith, consulting engineer for the Standard Slag Company of Youngstown, Ohio, reports equipment for the new explorative campaign is now on the site.

Sand, Gravel, Stone Output Up

According to reports received by the Bureau of Mines, the total production of sand and gravel in the United States in 1941 reached 288,715,000 short tons valued at $147,207,000 compared with 238,308,000 tons at $110,688,000 produced in 1940. This was an increase of 21 per cent. in quantity and 11 per cent. in value. Approximately 37 per cent. of the output was accounted for by contractors and construction or highway maintenance crews of federal, state, county, and municipal governments.

Sales reported by commercial producers amounted to 181,556,000 short tons valued at $114,707,000 in 1941 compared with 131,256,000 tons at $78,270,000 in 1940. The average value was 63 cents a ton in 1941 and 60 cents in 1940. All types of commercial sand and gravel showed substantial increases in production over 1940. Building sand increased 36 per cent., with an output of 40,165,000 short tons in 1941 compared with 29,592,000 tons in 1940. Building gravel increased 62 per cent., to 37,900,000 short tons in 1941 from 23,430,000 tons in 1940. The gain for paving sand was 30 per cent., production in 1941 being 27,013,000 short tons and 20,813,000 tons in 1940. Paving gravel increased 26 per cent. to 38,310,000 short tons in 1941 from 30,308,000 tons in 1940. Approximately 88 per cent. of the total commercial production, amounting to 159,784,000 short tons, was reported as washed or screened material with an average value of 67 cents a ton; unprepared material was 33 cents a ton.

Showing a very slight increase, sand and gravel from government-and-contractor operations amounted to 107,159,000 short tons in 1941 and 107,052,000 in 1940. Average value was 30 cents a ton.

The total output of crushed and broken stone in the United States in 1941, as reported to the Bureau of Mines, by producers, amounted to 181,160,980 short tons valued at $173,941,592, an increase of 19 per cent, in quantity and 26 per cent. in value compared with 1940.

Included in this total is stone sold or used for concrete aggregates, railroad ballast, riprap, agricultural limestone, refractory stone, stone for metallurgical use (flux), limestone sand, alkali works, calcium carbide works, sugar and glass factories, paper mills, and various othert chemical and manufacturing processes. Stone used in the manufacture of lime or cement, asphaltic stone, and slate used for granules or flour are not included in this total.

Crushed or broken stone used for concrete aggregates and railroad ballast constituted 67 per cent. of the industry in 1941—120,963,910 short tons valued at $114,522,259. Over 31 per cent. of the concrete and road-making aggregates was produced by noncommercial operators (states, counties, municipalities, and other government agencies). Noncommercial production in 1941 decreased 7 per cent. compared with 1940, whereas commercial output advanced 37 percent.

Crushed stone for metallurgical purposes, which ranks next to concrete aggregates in quantity consumed, increased 20 per cent. in quantity and 27 per cent. in value. Limestone for agricultural use (11,909,640 short tons valued at $14,395,831) increased 37 per cent. in quantity and 45 per cent. in value. Refractory stone (ganister, mica, schist, dolomite, and soapstone), amounted to 2,254,120 short tons valued at $3,279,104, an increase of 30 per cent. in quantity and 41 per cent. in value.

Trona Beds May Supply War's Soda-Ash Needs

The discovery in Wyoming of a large deposit of the non-metallic mineral "trona," a natural sodium carbonate plus almost unlimited resources of common salt, places the United States in a favorable position to supply its wartime needs for soda ash or sodium carbonate, an alkali which is used in the manufacture of munitions, aluminum and other critical and strategic metals, as well as glass, paints, soap and even sugar, according to Dr. R. R. Sayers, Director of the Bureau of Mines.

One of the trona beds, near Green River, Wyoming, lies at a depth of 1,500 to 1,600 feet and is 15 to 20 feet thick. The deposit appears to include reserves of hundreds of millions of tons and probably could be mined cheaply by the room and pillar system. California had the only natural soda deposits being worked in the United States in 1941. The output from these deposits accounted for about 4 per cent. of the total domestic production.

Dr. Bowles to Head Economics Division of Bureau of Mines

Dr. Oliver Bowles, geologist, mining engineer and internationally-known authority on nonmetallic minerals, has been named chief of the Nonmetal Economics Division of the Bureau of Mines. The division, a branch of the Economics and Statistics Service, is playing an important role in the war program, furnishing the War Production Board and other war agencies with information regarding available supplies, production and production methods for mica, graphite, cement, chemical raw materials, clays, asbestos magnesia and other minerals essential to victory.

Dr. Bowles, who formerly was assistant chief of the Nonmetal Economics Division, has been with the Bureau since 1914. He is the author of more than 100 Bureau of Mines publications, including eight bulletins, and has contributed hundreds of articles to technical publications in the field of nonmetallics. His 500-page book, "The Stone Industries," is one of the most comprehensive volumes written regarding quarrying in the United States and has received widespread circulation.

Prior to joining the Bureau, Dr. Bowles had gained extensive experience in the field of geology. During the summers of 1908 to 1910, Dr. Bowles carried on geologic field work in the wilds of Northern Ontario.

After coming to the United States, Dr. Bowles taught mineralogy and petrography at the University of Michigan and at the University of Minnesota and took graduate work at both universities, and at the same time worked during the summer months for the State Geological Survey of Minnesota.

As chief of the Nonmetal Economics Division of the Bureau, Dr. Bowles fills a vacancy created by the resignation of Paul M. Tyler, who left the Bureau to join the Board of Economic Warfare.

Incorporates Wisconsin Sand-and-Gravel Firm

Articles of incorporation have been filed by the Koepke Sand & Gravel Company, Menasha, Wisconsin. Capital stock consists of 250 shares at $100 each. Incorporators are L. H. Koepke and Ray C. Koepke, all of Appleton, Wisconsin.

Pit, Quarry Workers Held Essential; May Obtain Deferment

Emphasizing that the fundamental purposes of the Selective Training and Service Act of 1940, as amended, are the procurement of sufficient men for the armed forces and maintenance of production essential to win the war, Maj. Gen. Lewis B. Hershey, Director of Selective Service, on July 14 declared that, in so far as is practical in carrying out these requirements, the *bona fide* family relationship of registrants would be protected as long as possible.

At the same time National Selective Service headquarters announced the distribution to its agencies of a list of 34 broad essential activities compiled by the War Manpower Commission. The list, which includes under broad activity classifications "the products, facilities, and services considered necessary to war production and essential to the support of the war effort," was prepared to guide local boards when considering individual registrants for occupational classifications but in no way alters the statutory ban on group deferments.

The list of civilian activities necessary to war production and essential to the war effort, which may be used to guide local boards in considering occupational classification of registrants, specifies that such activities must meet one or more of the following tests:

(a) That the business is fulfilling a contract of the Army, Navy, Maritime Commission, or other governmental agencies engaged directly in war production;

(b) that the business is performing a governmental service directly concerned with promoting or facilitating war production;

(c) that the business is performing a service, governmental or private, directly concerned with providing food, clothing, shelter, health, safety, or other requisites of the civilian daily life in support of the war effort;

(d) that the business is supplying material under subcontracts for contracts included in (a), (b), or (c), above; or,

(e) that the business is producing raw materials, manufacturing materials, supplies, or equipment, or performing services necessary for the fulfillment of contracts included in (a), (b), (c), or (d) above.

Having found that the business in which a registrant is engaged comes under some group in the attached list, and having applied the tests and made the determination that it is an essential activity, consideration will be given to the occupation of the registrant, within that activity and, if he is found to be a "necessary man" as defined by Selective Service Regulations, occupational classification may be made by the board.

The list of essential activities of special interest to the nonmetallic-minerals industries follows:

Construction: Highway and street construction, marine construction; and construction of approved industrial plants, houses, hospitals, and military projects and repair of such facilities; as well as all basically metallic materials, parts, equipment; and services necessary to complete such construction.

Nonmetallic mining and processing and quarrying: The mining and processing of rock salt, phosphate rock, sulphur, potash, asbestos, graphite pyrites, graphite, borates and other salines, fluorspar, mica, talc, abrasive sands, and similar products. Excludes all mined or quarried nonmetallic materials used exclusively in construction.

Production of stone, clay and glass products: Technical, scientific, and industrial pressed and blown ware; sand-lime and fire-brick and other heat-resisting clay products; lime; abrasive wheels, stones, paper, cloth and related products; asbestos products including steam and other packing, pipe and boiler covering; crucibles and retorts; porcelain electrical supplies; as well as parts of military apparatus.

Issues Twenty Revised Asphalt Specifications

Twenty newly-revised asphalt construction specifications have just been issued by The Asphalt Institute. In their scope they range, in seven classifications, from high types "A" down to surface treatments "S."

Revision was made to incorporate: (a) present U. S. Bureau of Standards Simplified Practice relating to the gradation of aggregates; (b) the most recently developed equipment essentials; and (c) the latest Institute recommendations, based upon a correlation of its laboratory studies and field engineering experience.

Slate Industry Enjoys Improved Conditions

Slate sold at quarries in the United States in 1941 amounted to 618,660 short tons valued at $7,515,634, according to figures compiled by the Bureau of Mines. This was an increase of 31 per cent. in both quantity and value compared with 1940.

Sales of crushed slate for roofing granules and flour, which amounted to 437,670 short tons valued at $3,105,800, increased 37 per cent. in quantity and 35 per cent. in value compared with 1940.

Intensive Mining of Mica Deposits in New England Sought

Steps being taken by the federal government to foster war-urgent mica mining and production in New England "even if not economical by peacetime standards" were outlined to interested persons from Vermont, Maine, Connecticut, Massachusetts and New Hampshire at a recent meeting held at Canaan, New Hampshire, under sponsorship of the New England Industrial Research Foundation, the New Hampshire Planning and Development Commission and other agencies.

Emphasizing the importance of domestic production of the vital mineral because of the precarious Indian export situation, Raymond B. Ladoo of Washington, chief of the WPB mica division, told of the government-subsidized Colonial Mica Corporation of New York, a non-profit group, which will lease machinery at low rates to approved property owners and find ready markets for high-grade type of material.

"Ninety-five per cent. of mica goes to the war," Mr. Ladoo said. "Practically every device is dependent upon the use of mica. In dollar value the amount of mica in a finished tank or bomber or submarine is trifling. But none of them can function without it. The mica now needed is the high-grade, flat, clear sheets at least one and one-half by two inches in size."

George A. Purcell, president of Colonial Mica Corporation, said that his company, with no assets, no income and no profit, would make it possible for even sub-marginal mines to operate and receive the maximum value of production. The question of what prices will be paid for mica, he said, was as yet undetermined. Strategic mica, however, and products made from such mica are exempt from the operation of the general price-freezing order.

Urging mica men to contact the corporation's New York office from which field men would be sent out to examine properties, Mr. Purcell said the government also was working to overcome the labor supply problem. The federal government, he said, already has sent a directive order to local rationing boards to give first consideration to mica miners and workers on tire-retread requests. He also mentioned the possibility soon of selective-service exemption and gasoline preferences for such men.

CURRENT BUSINESS INDICATORS

Chairman Donald Nelson's reorganization of WPB, announced on July 8, was an unqualified disappointment. Indeed, as Mr. Nelson admitted, it was a realinement rather than a reorganization. The few minor changes that were effected, moreover, were largely empty formalities. William L. Batt and James S. Knowlson were elevated to the rank of vice-chairmen; Amory Houghton, formerly deputy chief of the Bureau of Industry Branches, was promoted to Director General of Operations; while Phillip D. Reed, who has been the center of a storm of controversy for several months, was named special emissary to Great Britain. In brief, by the shop-worn device of shifting old faces to new places we are expected to believe that the lumbering War Production Board has been girded for the tremendous task of the next few months.

From the view point of business, the most interesting aspect of the proceedings is that the grip of the armed services on the economy of the Nation has tightened appreciably. In the battle that raged behind the scenes during the days immediately preceding the "reorganization," the Army and Navy won a decisive victory. To be sure, the physical job of allocating the scarce materials has been left in the hands of WPB, but this means little when the actual division of the available supply can be directed by the services. For practical purposes, WPB retains control over the flow of materials to civilian industries and that is about all. In war industries final authority over priorities is retained by the Army and Navy. From the point of view of the people as a whole and the objective of winning the war, too much control remains in the hands of men who place private business interests above the security of the nation.

Although the turn of events in Washington was distinctly disappointing, news from the production lines continues favorable. Measured by the Federal Reserve Board's composite index of production in manufacturing and mining, industrial activity in June advanced to a new "peak." Compared with a revised index of 175 for May, the preliminary index for June stood at 177 (1935-39 = 100). In the corresponding month of last year the index was 159 per cent. of the 1935-39 average. This indicates that industrial production as a whole has increased 11 per cent. during the past year. It is expected, moreover, that the index will reach the 200 level during the next twelve months.

Even more significant than the absolute increase in industrial activity is the fact that military items accounted for 70 per cent. of the total durable-goods production in June. The Federal Reserve Board also estimates that approximately one-half of our total industrial output during the month was for war purposes. War-goods production is expected to account for a still larger share of our total industrial output during the next few months.

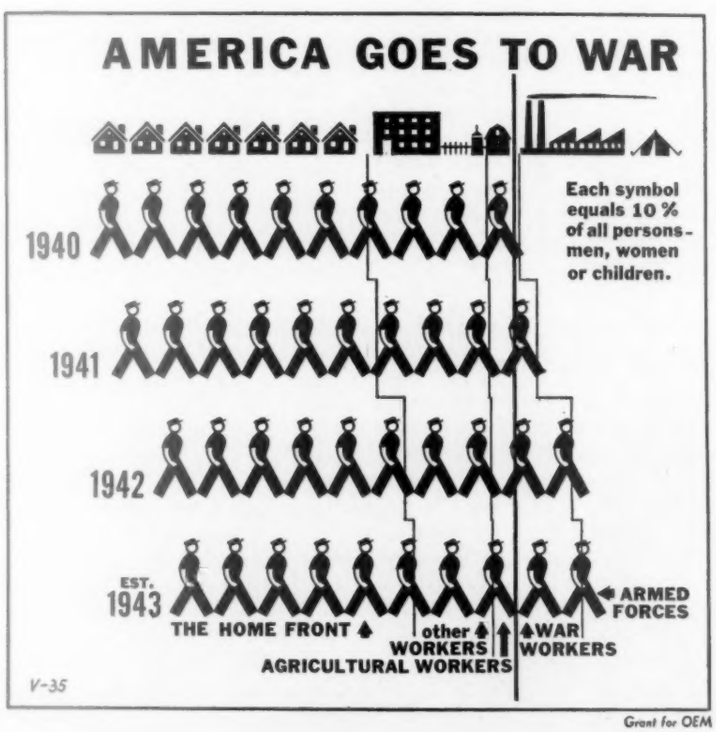
In June, as in the months immediately preceding, the steel and construction industries contributed heavily to the advance of the composite index of industrial production. Other noteworthy gains were registered, however, in electric-power production and freight-car loadings. All the evidence suggests that further impressive increases were made in the production of aircraft, ships, tanks, and armament during the month.

Steel production in June amounted to 7,022,155 tons, bringing the total output for the first half of the current year to 42,570,247 tons. In comparison with the corresponding period of 1941, this represents an increase of more than 4 per cent. and is 1.4 per cent. above the tonnage produced in the last half of 1941. Barring labor disturbances and serious scrap shortages, it now appears probable that the total production for the year will reach 85,000,000 tons.

The rise in industrial output is reflected in employment. Total employment is now estimated at somewhat more than 50,000,000, the highest in the history of the country, surpassing even the "boom" days of 1929. The number of persons engaged in work directly connected with the war was estimated at 12,500,000 as of July 1, as compared with 9,000,000 on April 1, and 6,000,000 on January 1.

War spending in June rose to a total of $4,123,600,000, a daily average of $158,660,000. This is an increase of 6.3 per cent. over May. A further increase in the rate of expenditures for war purposes is expected during the current month.

Prices remained virtually unchanged during the past month. For the week ended July 11 the Bureau of Labor Statistics' index of wholesale commodity prices stood at 98.5 per cent. of the 1926 average, indicating that the general level of prices has risen only 0.1 per cent. during the month.



Grant for OEM

Asbestos in Brake linings.—Order M-123 was amended July 6 by the Director of Industry Operations, WPB, to permit the use of asbestos textiles in the manufacture of brake linings, clutch facings and other woven friction materials without an A-10 rating.

Under the existing order this rating is required and has been obtained by the automotive industry through orders P-54 and P-57. With the use of the Production Requirements Plan these orders will be eliminated. This amendment will permit the orderly flow of this material to the automotive industry without a rating.

As the manufacture of woven friction material is set up to supply the normal needs of the automotive industry the amount available is far in excess of current demand.

Automotive Spare Parts.—A blanket order governing production of spare parts for all types of automotive equipment and imposing rigid restrictions on inventories was issued July 6 by the Director of Industry Operations, WPB.

Approximately 1,400 manufacturers of replacement parts for passenger cars, light, medium and heavy trucks, trailers, buses and off-the-highway vehicles are affected by the order (L-158), which covers the two remaining quarters of this year and supersedes all previous orders (L-35, L-4 and L-4-c) relating to spare parts.

Parts to be produced under the terms of the order represent the minimum number required to retain the efficiency of the country's motor-transportation system. Because of the rigid production and inventory restrictions, it is expected that high priority assistance will be made available to parts producers so that essential motor vehicles can be maintained for the duration of the war.

An important feature of the order, which is expected to make available to the national scrap pile a quantity of scarce materials almost equal to that involved in the production of new spare parts, is a provision requiring consumers, after July 15, to turn in to distributors a used part before accepting delivery of a new part. In addition, the order provides no new part may be sold or delivered to a consumer to replace a part which can be reconditioned by a distributor.

During the third and fourth quarters of this year, producers will be permitted to manufacture parts on either of two bases.

Manufacturers of parts for medium and heavy trucks, trailers, buses and off-the-highway vehicles may make up to 125 per cent. of their sales of these parts during the same period last year, provided their over-all inventory of parts does not exceed a 4-month supply. On the other hand, if their inventory exceeds a 4-month supply they may manufacture up to 75 per cent. of their sales during the same period in 1941, provided they do not increase their inventory position at the end of each calendar quarter over what it was at the beginning of each calendar quarter.

Manufacturers of spare parts for passenger cars and light trucks may make up to 70 per cent. of their sales during the corresponding quarter last year, provided their over-all inventory does not exceed a four-month supply. If their inventory is in excess of this amount, they may manufacture up to 50 per cent. of their sales during the same period last year, provided they do not increase their inventory position at the end of each calendar quarter over what it was at the beginning of each calendar quarter.

The production restrictions do not apply to orders for delivery to the Army and Navy, certain specified government agencies, the governments of the United Nations, and to Lend-Lease shipments.

After August 15 distributors in the Eastern and Central time zones will be limited to a 60-day supply of spare parts, in dollar value and distributors in other time zones will be restricted to a 90-day supply. However, distributors may order and accept delivery of any part which is not in stock but which is required for emergency repair of a vehicle. A certificate for such emergency orders must be filed with producers, and producers must give these orders preference in their shipping schedules.

The order, like the previous orders which it supersedes, applies only to designated repair parts, and is not applicable to parts which are not essential to the operation of a vehicle. A specific provision is included prohibiting production of so-called non-functional parts for medium and heavy trucks, buses and off-the-highway vehicles after July 31.

Bauxite Allocated.—Increased bauxite production in southern ore fields was forecast July 7 by the action of the Director of Industry Operations in placing bauxite and alumina, from which aluminum is produced, under complete allocation control. The action, taken by issuance of Order M-1-h, was made necessary by the rapid increase in aluminum production and the increasingly serious shipping situation.

The purpose of the order is to conserve high-grade bauxite, that containing less than 15 per cent. silica, for the manufacture of products needed for war.

Both Arkansas and imported bauxite containing less than 15 per cent. silica will be allocated primarily for the manufacture of aluminum, abrasives and aviation gasoline. Restricted as well as non-restricted grades mined in Alabama, Georgia, Virginia, Tennessee, Mississippi and other states from small and scattered deposits will be permitted a more general use, such as the manufacture of chemicals and refractories.

Arkansas is the principal domestic source of high-grade bauxite, the bulk of the country's regular supply being imported from South America.

Use of high-silica bauxite, clay and other aluminous materials in the manufacture of chemical salts is expected to save several hundred thousand tons a year of high-grade bauxite for war purposes.

The order, which is effective August 1, gives consumers of restricted bauxite and alumina until September 1 to use up materials on hand, provided the amount used between July 1 and August 31 does not exceed one-third the amount so used during the last six months of 1941.

Consumers of bauxite must file requests for allocation on Form PD-567 and alumina users Form PD-568.

Increasing quantities of high-grade bauxite and alumina are necessary because of the great expansion in aluminum output now under way. Alumina requirements for 1943 are expected almost to double 1942 needs.

Cement Industry Committee.—The WPB cement-industry advisory committee has the following membership:

Government presiding officer: John L. Haynes, chief, Building Materials Branch.

Industry Members: M. M. Alexander, Missouri Portland Cement Co., St. Louis, Mo.; Garner A. Beckett, Riverside Cement Co., Los Angeles, Cal.; L. N. Bryant, Green Bag Cement Co., Pittsburgh, Pa.; R. W. Crum, Highway Research Board, Washington, D. C.; A. E. Douglass, Allentown Portland Cement Co., Catasauqua, Pa.; Edwin P. Lucas, Superior Portland Cement, Inc., Seattle, Wash.; L. Morris Mitchell, Merritt, Chapman & Scott, New York, N. Y.; John F. Neylan, Lone Star Cement Co., New York, N. Y.; W. C. Russell, Peerless Cement Co., Detroit, Mich.; Blaine S. Smith, Universal Atlas Cement Co., New York, N. Y.; S. W. Storey, Trinity Portland Cement Co., Chicago, Ill.; Joseph S. Young, Lehigh Portland Cement Co., Allentown, Pa.; W. A. Wecker, Marquette Cement Mfg. Co., Chicago, Ill.; Herbert A. Snow, Portland Cement Co. of Utah, Salt Lake City, Utah.

Gypsum—Industry Advisory Committee.—The Bureau of Industry Advisory Committees has appointed the following advisory committee for the gypsum industry.

J. L. Haynes, Chief of the Building Materials Branch, is Government Presiding Officer.

Committee members are:

John C. Best, National Gypsum Co., Buffalo, N. Y.

H. E. Chism, Texas Cement Plaster Co., Oklahoma City, Okla.

F. G. Ebsary, Ebsary Gypsum Co., New York, N. Y.

Gordon C. Estes, Certain-Teed Products Corp., Chicago, Ill.

W. L. Keady, U. S. Gypsum Co., Chicago, Ill.

W. H. Kellogg, Jr., Connecticut Adamant Plaster Co., New Haven, Conn.

James Leenhouts, Grand Rapids Plaster Co., Grand Rapids, Mich.

Ezra Sensibar, Cardiff Gypsum Co., Chicago, Ill.

Vincent S. Villard, Newark Plaster Co., New York, N. Y.

Martin Uldall, Pacific Portland Cement Co., San Francisco, Cal.

Industrial-Plant Construction Material.—Limitation Order L-117 was amended July 10 so that contractors engaged in the construction of industrial plants may obtain delivery of heavy power and steam equipment to be used in such plants by extending preference rating certificates on orders issued to the persons for whom such plants are being constructed. Heretofore Order L-117 permitted heavy power and steam equipment to be delivered only to the person to whom a preference rating certificate or order was originally issued.

Industrial Trucks.—Strict control of the production and distribution of industrial power trucks was ordered by the War Production Board July 10. General Limitation Order L-112 is designed to cut the use of critical materials to a practical minimum and limit the manufacture of models to those required to do the job for the duration of the war.

Effective immediately, manufacturers are prohibited from accepting any order for an industrial power truck other than an order rated A-9 or higher on Preference Rating Certificate PD-1A or PD-3A. In addition, no manufacturer may deliver, and no person may accept delivery of, any industrial power truck except on an order placed before July 10 bearing a rating of A-1-k or higher, or on an order placed after that date rated A-9 or higher on PD-1A or PD-3A. These restrictions do not apply to equipment placed in the hands of a common or contract carrier, before July 10, for shipment to a purchaser.

The order prohibits manufacturers from beginning construction after July 10 of any industrial power truck which is not a standard model as described in a manufacturer's catalogue as of that date and as specified in List A attached to the order. Certain exemptions are provided for special-type trucks.

After August 15 manufacturers may not begin production of any standard model which is not an "approved standard model," the types of which will be set forth from time to time in supplementary orders.

The order also seeks to conserve materials by establishing certain manufacturing restrictions which prohibit the production of any industrial power trucks containing specified critical materials, such as rubber, copper, steel plate and lead, except for certain functional parts where substitution of less critical materials is impossible. These restrictions do not apply to parts in manufacturer's stocks which, as of July 10, were completed or processed to the point where other use would be impracticable, or to the manufacture or delivery of repair or maintenance parts.

LIST A

No-lift, high-platform	1,000 lb. to 20,000 lb.
No-lift, low-platform	1,000 lb. to 20,000 lb.
Low-lift, high-platform	2,000 lb. to 20,000 lb.
Low-lift, low-platform	2,000 lb. to 20,000 lb.
High-lift, low-platform	2,000 lb. to 10,000 lb.
Fork or ram	2,000 lb. to 60,000 lb.
Crane	2,000 lb. to 20,000 lb.
Tractor	*1,500 lb. to 6,000 lb.
Motorized low-lift	2,000 lb. to 6,000 lb.
Straddle trucks	10,000 lb. to 30,000 lb.

*Maximum draw-bar pull.

Machinery Prices.—Sweeping revision of existing price regulations for machines and parts, together with a broadening of controls to cover subassemblies, their components, and machinery services, was announced July 1 by Price Administrator Leon Henderson. The changes in the machinery-price-control structure are embodied in Maximum Price Regulation No. 136, as amended, which supersedes a regulation bearing the same number which was to have gone into effect July 1, 1942.

Maximum Price Regulation No. 136, as amended, covers machines and parts, and machinery services. This regulation formalizes informal controls over machinery which were set up during the fall of 1941 and the early part of 1942. These informal controls had covered nearly all industrial machinery, railroad equipment and electrical equipment. The regulation also extends control to parts and sub assemblies of such machinery and equipment. Most of the field covered by this regulation is of vital importance in the war effort. Some of the equipment covered enters directly into military items.

The Regulation, as amended, became operative July 22, 1942. In connection with the advancement of the effective date, the Price Administrator warned that persons affected by the Regulation, especially dealers in second-hand machinery, should in the interim exercise extreme care to avoid making any purchases at excessive prices. After July 22 sales will have to conform to the maximum price requirements, regardless of the purchase prices paid. If any deliveries are made at higher than maximum prices, refunds will have to be made prior to September 1.

The Regulation, as amended, brings the following changes and additions to the previous measure with respect to coverage and price-basing dates:

1—It sets forth a long list of specific machines and parts, and provides that maximum prices for such machines shall be no higher than those charged October 1, 1941.

2—It sets forth another specific list of machine parts and provides that their maximum prices shall be no higher than those charged March 31, 1942. These two lists set forth the complete coverage of the Regulation.

3—For purposes of clarification the Regulation contains an illustrative list of products not covered by Regulation No. 136, but which are covered by the General Maximum Price Regulation or other specific regulations.

4—It provides March 31, 1942 as the basing date to be used in determining maximum prices for machinery services, and includes a number of services previously in the General Maximum Price Regulation.

For machines or parts for which the manufacturer does not have list prices, the regulation provides that maximum prices are to be computed on the basis of the following pricing formula:

1—The price-determining method which was in use on the price basing date, applying the overhead rate, machine hour rates, if any, or other bases of computation which were in use on that date;

2—Labor rates in effect on the price basing date;

3—Materials prices in effect on the price basing date with some exceptions;

4—Actual prices paid or to be paid for subcontracted machinery services, not in excess of maximum prices provided by the Regulation, as amended;

5—Freight rates in effect on March 31, 1942;

6—If sold on an installed basis, labor rates in the area of installation in effect on, or agreed to or announced on or before April 27, 1942 for labor required for installation, or where the wage stabilization agreement issued May 22, 1942 between the Building and Construction Trades Department of the American Federation of Labor and certain agencies of the United States is operative, labor rates in effect on July 1, 1942.

Items listed in Appendix A of the regulation, for which maximum prices are to be computed with October 1, 1941 as the basing date, include prime movers (such as heavy engines and turbines), industrial and marine power apparatus, processing machinery and equipment, construction and mining machinery, a long list of electrical equipment, railroad equipment, and auxiliary and miscellaneous equipment.

Those to which the March 31, 1942 basing date is applicable, include miscellaneous parts and subassemblies and auxiliary tools for machinery.

Illustrative of products excluded from this regulation are aircraft gasoline and Diesel engines, automotive replacement parts, bolts, nuts, screws and rivets, carpenter's tools, ferrous and non-ferrous castings as sold by the foundry, etc.

Items of interest to the nonmetallic-minerals industries are listed below:

1390.32 *Appendix A: Machines and Parts to which the October 1, 1941 date is applicable.* [Partial lists follow.—Ed.]

(a) *Prime Movers:*
- Diesel engines, except aircraft Diesel engines.
- Gas engines and gas generators.
- Gasoline and kerosene engines for marine, tractor, railway, and stationary use.
- Steam engines and steam turbines.

(b) *Industrial and Marine-Power Apparatus:*
- Boilers, industrial and marine.
- Oil burners, industrial and marine (burning not less than No. 6 oil).
- Stokers, industrial and marine (1200 pounds per hour or more).

(c) *Processing Machinery and Equipment:*
- Ceramics Machinery.

(d) *Construction and Mining Machinery:*
- Asphalt-mixing plants.
- Concrete mixing, placing and finishing equipment
- Cranes (overhead, crawler, and locomotive), hoists and derricks.
- Crawler and non-agricultural tractors.
- Core-drilling machinery.
- Excavating and earth-moving machinery (including power shovels, ditchers, draglines and power scrapers).
- Dredging machinery.
- Heaters (stone, sand or bitumen).
- Mining machinery (including mine cars and trucks).
- Ore-crushing and concentrating machinery.
- Portable power-driven tools.
- Rock crushers.
- Spreaders.
- Well-drilling equipment.

(e) *Electrical Equipment:*
- Arc and resistance welding equipment, electrodes and supplies.
- Capacitors.
- Carbon, graphite and metal graphite products for electrical uses.
- Circuit breakers.
- Commercial lighting equipment.
- Communication equipment (including telephone, telegraph, signalling apparatus and public-address systems).
- Conduit fittings.
- Electric motors, generators, and renewal parts (except automotive).
- Electric motor-generator sets.
- Electric storage batteries.
- Electrical control equipment (including magnet and renewal parts), except control devices used for domestic installations.
- Electrical industrial heating units and devices.
- Electrical-power conversion and rectifying equipment of any type or size.
- Electrical wire, cable and cable accessories (except when subject to Revised Price Schedule No. 82 as amended.
- Feeder voltage regulators.
- Flood-lighting equipment.
- Instruments for measuring electrical equipment.
- Industrial and marine electrical-lighting equipment.

Instruments for Measuring electrical quantities (except automotive).
Knife and inclosed switches.
Magnetos.
Metallic outlets and switchboxes.
Metallic and non-metallic ducts.
Outdoor and indoor substations.
Panel and distribution boards, except asbestos and cement boards.
Switchgear and switchgear accessories.
Synchronous condensers.
Transformers, including specialty transformers.
Trolley-line material.
Turbine-generator sets.
Wiring devices.
X-ray and electro-therapeutic apparatus.

(f) *Railroad Equipment:* (for steam and electric Railroads and surface, elevated and underground railways).
Freight cars.
Passenger cars.
Locomotives and tenders (including mining and industrial).
Car and locomotive parts and specialties, including:
Bearings, truck-side.
Boilers, fireboxes, front ends, and cabs and fittings, fixtures, devices or appliances mounted thereon.
Brakes and brake gear.
Coupler devices or attachments.
Devices and appliances mounted on locomotives for treatment, distribution and control of water, fuel, steam, sand and electricity.
Doors and fixtures (except those subject to Revised Price Schedule No. 40—Builders' Hardware and Insect Screen Cloth.)
Draft gears, buffers and attachments.
Driving, foundation and running gear.
Heating, lighting, ventilating and air-conditioning equipment.
Journal boxes, assembled.
Lubricating devices.
Miscellaneous fittings, fixtures, specialties, devices or appliances designed specifically for use on cars or locomotives (not including artillery or other exclusively military or naval equipment designed for mounting on cars or locomotives).
Safety appliances and warning devices.
Sides, roofs, ends, running boards, brake steps.
Spring rigging, snubbers, shock absorbers,
Steel tires.
Trucks, complete.
Underframes.
Wheels, cast-iron and spun-steel.
Machines, tools, devices and appliances designed specifically for the installation, operation, maintenance and protection of tracks, yards, signals, rolling stock and motive power.
Signal equipment, including highway crossing signals.
Stationary plants for handling fuel, sand, water and cinders.

(g) *Auxiliary Equipment:*
Dust-collecting equipment, industrial.
Furnaces and ovens, industrial.
Heat-exchange equipment and pressure vessels, industrial.
Lubricating systems and devices, industrial.
Material-handling equipment, industrial (cars, trucks, hacks, etc.).
Water-softening and purifying equipment, industrial.

(h) *Miscellaneous:*
Elevators and conveyors.
Fans and blowers (including domestic hot-air furnace fans), except pedestal, portable and ceiling household office fans.
Gas welding and cutting equipment.
Mechanical instruments for measuring, testing, recording, or indicating, including aircraft, marine, scientific, laboratory, and precision instruments, (not including carpenters' tools, or surgical, optical, and dental instruments).
Portable heating, welding, burning and thawing equipment.
Pumps and compressors except automotive, hand-operated and farm pumps.
Surveying and drafting instruments (not including school, art and office supplies).
Weighing scales, industrial and platform
Valves, automatic.

(i) *Miscellaneous Parts and Subassemblics:*
Anti-friction bearings.
Chains, sprocket, and roller and silent.
Galvanometer and pyrometer movements.
Gears, pinions, sprockets, and speed-reducers (except when subject to Revised Price Schedule No. 105, as amended).
Industrial clockwork systems used in connection with mechanical instruments.
Industrial power-transmission equipment, belt tighteners and shifters, clutches, couplings and collars, hangers and brackets, motor bases, pillow blocks and bearing housings, pulleys and sheaves, universal joints, variable-speed drives.
Springs for mechanical instruments.

1390.34 *Appendix C: Illustrative list of products not covered by Maximum Price Regulation No. 136.*

(*Note:* Maximum prices for the following products are established by the General Maximum Price Regulation or by other price schedules, regulations, or orders issued by the Office of Price Administration.)
Abrasive wheels.
Automotive electric motors and generators.
Automotive gasoline engines.
Automotive parts and subassemblies (except batteries) manufactured prior to 1942 or authorized by the WPB to be manufactured in 1942, when such parts and subassemblies are sold for use in private or commercial motor vehicles of 1942 or earlier models.
Automotive pumps.
Bolts, nuts, screws, and rivets (as defined in Maximum Price Regulation No. 147).
Carpenter's tools.
Castings, ferrous and non-ferrous, as sold by the foundry, whether rough or machined.
Drill pipe, casing and tubing.
Dry batteries.
Frames, bolsters, couplers, and yokes (as defined in Revised Price Schedule No. 41 —*Steel Castings*).
Hand-hoist chains.
Hand tools.
Iron and steel products (as defined in Revised Price Schedule No. 6).
Manual valves.
Mechanical rubber goods (as defined in Maximum Price Regulation No. 149).
Non-ferrous forgings.
Office machines.
Rubber belts and belting.

Mechanical Rubber Restrictions.—Further conservation of rubber by more stringent specifications for a long list of civilian products was ordered July 21 by the Director-General for Operations.

Amendment No. 9 to Order M-15-b-1 sets up revised specifications for conveyor, elevator and transmission belting, hose, packing, pipe coupling rings, and rubber-protected industrial equipment, abrasive implements and mine and industry safety parts.

The changes in Amendment No. 9 are expected to result in the saving of from 300 to 400 tons of crude rubber per month. An additional 100 tons a month is expected to be saved by the changed rubber-footwear specifications, with the same number of pairs manufactured per year is in the past.

Mining Branch Moved.—The address of the Mining Branch of WPB has been changed again. All correspondence should now be addressed to E. W. Bauman, Mining Branch, War Production Board, Room 1430, Temporary Building "R," 4th and Jefferson Drive, S. W., Washington, D. C. Mr. Bauman's telephone number is still Republic 7500, extension 3334. His assistants are James Bacon, whose extension number is 72367, and Don Gotham and Ben Hudson, whose extension number is 4965.

Preference Ratings Extendible.—The use of preference ratings has been simplified and standardized by the terms of an amendment to Priorities Regulation No. 3, announced June 12 by the Director of Industry Operations.

Effective July 1, any preference rating, no matter how it has been assigned, may be applied or extended by a single form of certification, which states merely that the purchaser certified to the seller and to the War Production Board that he is entitled to use the preference ratings indicated on his purchase order, in accordance with the terms of Priorities Regulation No. 3.

Provisions of existing orders which require a purchaser to furnish his supplier with copies of preference-rating orders or other special certifications are all rescinded, except for the special provisions of Priorities Regulation No. 9 with respect to the application of preference ratings for certain types of exports. This change does not, however, affect any provision of existing preference rating orders which limits the kinds of material which may be obtained by use of the assigned rating, or which requires specific information on purchase orders.

In addition to the standard certification, orders on which a preference rating is applied or extended after July 1 must also include the identification symbols required by Priorities Regulation No. 10, which established the Allocation Classification system.

The amended Regulation No. 3 restricts extension of preference ratings, in most cases, to material which will be delivered to, or physically incorporated in a product delivered to the person to whom the rating was originally assigned, or which will be used to replace in inventory materials so delivered, subject to definite limitations. A rating may not be extended to replace materials in inventory except to the extent necessary to restore the inventory to a practicable working minimum. No rating higher than A-1-b may be assigned to orders for replacement of materials in inventory, even though the order for which the materials were used may have carried a higher rating.

A "basketing" provision permits the simultaneous extension of ratings which have been assigned by different preference-rating certificates or orders on a single purchase order. When ratings are "basketed" in this way, the lowest rating may be extended for the whole order, or the various items in connection with

which the ratings are extended may be listed separately, with the corresponding rating applied to each.

Members of the Washington Appeal Board, in a report to the ODT, disclosed that a high percentage of the appeals gave incomplete information and that many applicants engaged in defense work carrying high priorities "took too much for granted" and failed to show actual need in applying for permission to purchase new equipment.

It was found that many vehicles which the applicants intended to trade in on new equipment could be rebuilt or repaired, that applications for permission to purchase specially designed equipment were frequently presented on "business-as-usual" basis rather than need and that there was little indication that those whose applications were rejected had taken steps to attain fuller utilization of their present equipment or to cooperate with other carriers for purposes of conservation.

Priorities Under PRP.— A revised form of application for priority assistance under the Production Requirements Plan to be used for the third quarter of 1942 was released by the WPB on July 23. All manufacturers who are required to obtain priority assistance under the PRP must file the revised form PD-25A with the WPB not later than August 10 in order to get such assistance for the fourth quarter of 1942.

New instructions to applicants for preference ratings under the Production Requirements Plan will allow them to omit a considerable part of the information which has previously been required. Users of materials will also be able to supply the same reports on PRP applications which they are now preparing in answer to the general metals questionnaire, Form PD-275, and duplication of paper work will thus be avoided.

The new instructions will simplify the preparation of PRP applications by the many additional companies which must begin operating under the Production Requirements Plan in the quarter starting July 1. In accordance with a policy recently announced, most of the limited blanket ratings under which preference ratings have been assigned on an industry-wide basis will be revoked or allowed to expire, and companies which have been using the blanket ratings will be required to apply under PRP.

To assure fair and uniform treatment of applicants under PRP specific directions for assignment of ratings in accordance with the importance of various products in the war and civilian economy are now being prepared by the industry branches of the War Production Board. These directions will specify the grade of ratings—A-1-c, A-3, etc. —which should normally be granted for the use of each industry or type of production, and will indicate the policy to be followed in determining the amounts of materials to which such ratings may be assigned in each case.

These processing directions will be made public from time to time as they are ready for use. This will enable producers to know just where they stand with respect to priorities, and will assure uniform treatment for all firms handling the same type of war and essential civilian production in each industry.

Under the new program, assignments of ratings to PRP applicants will depend increasingly on the nature and use of the applicant's product, less on the pattern of preference ratings on the orders which he has on his books. For example, high ratings would be assigned to a manufacturer of parts which would ultimately be incorporated in military planes or tanks, without his having to prove that 75 per cent. of his orders were A-1-a, 15 per cent. A-1-b, etc.

This emphasis on the use of the product rather than on the pattern of existing preference ratings on orders to be filled by the applicant makes it possible to eliminate a considerable part of the information which has previously been required from PRP applicants, and constitutes the basis for the new, simplified instructions.

For the present the revised PD-25A application form for the Production Requirements Plan which was prepared for the April-June quarter will continue to be used, but the instructions specify that many of the columns may be left blank. These instructions are now available in War Production Board field offices, and applications on the simplified basis will be accepted, effective immediately.

Processing directions for assignment of ratings under PRP will, to a certain extent, replace the orders of the "P" series under which ratings have previously been assigned to various industries. The procedure under PRP will be somewhat different from the procedure under the limited blanket ratings, however, because ratings assigned to applicants under PRP may be applied only to a specified quantity of materials or products to be delivered in a calendar quarter. In some cases, applicants may be given a higher rating for limited quantities of specific kinds of scarce materials in this way than they would be entitled to use for all of their requirements under a "P" order.

Applicants who have used form PD-25X in the past should now apply on form PD-25A as simplified. Use of the PD-25X form was discontinued on May 23.

PRP applications from producers and industries for which a processing direction has not yet been issued will be handled in much the same way as individual applications on PD-1A forms, by concurrence in the ratings and the amounts of materials for which the ratings are assigned between the Production Requirements Branch and the industry and materials branches concerned.

The application form to be used by PRP applicants in connection with the new procedure will be the pink form as revised for the April-June quarter. The headings may be changed so that this form can be used for the July-September, or subsequent quarters, and only those columns need to be filled out which are listed in the new instructions. However, all applicants hereafter will be required to fill out *Section E and F Supplement,* which had been optional.

The reduction in the amount of information required from applicants under the Production Requirements Plan will make its use easier for many new industries which are expected to operate under the plan beginning July 1, 1942. At the same time, processing of applications in the branches of the War Production Board will be simpler and faster.

Applicants who must put materials in process during a calendar quarter for delivery in a subsequent quarter may file a second PD-25A application covering the additional quarter.

Specific changes in the use of form PD-25A, as outlined in the new instructions are as follows:

1. In *Section B* the reports of shipments in the most recent three months for which figures are available no longer need to be broken down by preference ratings; only total shipments must be reported.

Specifically, the applicant will no longer be required to fill in Columns 6, 7, 8 and 9 under *Section B.*

2. Reports under *Section C*—inventory reports covering classes of products included in *Section B*—are eliminated entirely.

3. Under *Section D* the column headed "Unfilled Orders" must be changed to "Orders Scheduled for Shipment During Quarter." This will enable the War Production Board to obtain a more accurate picture of the immediate materials requirements of the applicant, and assign proper ratings to him on the basis of his production schedule for the calendar quarter, rather than on the basis of all unfilled orders on his books, some of which may bear low preference ratings and be deferred for a considerable length of time.

4. In *Section E* applicants will hereafter disregard columns 4 and 5, covering "Inventory Beginning of Quarter" and "received During Quarter." Under "Statement for Quarter Ending .... (most recent 3 months for which figures are available)" they will fill in only columns 6 and 7, in which they report past use, and inventory at the end of the quarter.

The heading of Columns 8, 9, 10, and 11, covering anticipated requirements, should be changed from "Quarter Ending June 30, 1942" to "Quarter Ending September 30, 1942," or the closing date of any calendar quarter for which the application is submitted.

The heading of Column 10 under *Section E,* now "Leave Blank," should be changed to "To Be Received During Quarter." In this column the applicant will report his requirements of new materials to be received from his suppliers during the quarter; the difference between column 8 and column 10 will represent the amount of materials which he can take from inventory.

A new and simpler classification list for metals, showing the form in which they are to be reported in *Section E,* accompanies the new instruction sheet. This classification list conforms with the list used on the general metals questionnaire, Form PD-275, and is to be substituted for the classification of metals now contained in Materials List No. 1 of Form PD-25A. Other materials are to be reported in *Section F* in accordance with Materials List No. 1, as before.

5. Changes in *Section F,* on which applicants report inventories and requirement of materials not contained in Materials List No. 1 or in the metals classification, are exactly the same as the changes to be made in *Section E*—columns 4 and 5 will be disregarded, and in column 10, the applicant will report the dollar value of receipts of such materials which he needs to fill his requirements during the quarter.

6. Under *Section G* applicants may now also include requirements for minor capital items. However, such capital items must be directly concerned with plant operations, must not include office machinery or any machinery for addition to or expansion of existing facilities, and must not include machine tools or large equipment items.

7. *Sections E and F Supplement,* in which anticipated requirements are broken down by classes of products produced, must hereafter be filled in by all applicants under the Production Requirements Plan. However, this section now becomes in fact a supplement to *Section E* only; the report should include only anticipated requirements of materials listed in Materials List No. 1 or in the metals classification list, and must not include other materials reported in *Section F.* Consequently, the totals of the quantities entered in the anticipated requirements columns—columns 12, 14, 16 and additional columns if necessary—must equal the requirements of each material reported in column 8 of *Section E.*

Elimination of the figures previously required on Form PD-25A in the columns which have now been cancelled will mean that applications will be rated in the War Production Board to an increasing extent on the basis of the importance of the applicant's products or the end use of his products, and less consideration will be given to the existing pattern of preference ratings on his orders.

This constitutes a further step toward use of the Production Requirements Plan as a method of allocating specific quantities of materials to producers on the basis of the importance of their operations in war and essential civilian production.

Refractory-Brick Material Inventory.—Inventory restrictions on materials for the manufacture of refractory brick, used in heat-treating furnaces for the manufacture of steel and other products, have been lifted by the terms of an order issued June 1 by the Director of Industry Operations. General Inventory Order M-161 exempts sixteen materials, none of them scarce from the inventory restrictions of Priorities Regulation No. 1. The purpose of the order is to encourage the purchase of the bulky materials at a time when transportation facilities are not overburdened. The sixteen exempted materials are: bentonite, kaolin, ball clay, stoneware clay, diatomaceous earth, feldspar, spodumene, potter's flint, domestic andalusite, domestic dumortierite, domestic kyanite, domestic sillimanite, pinite, pyrophyllite soapstone, and talc.

Return-Load Order Canceled.—A revision of General Order ODT No. 3, governing over-the-road operations of motor trucks by common carriers, was issued July 14 by Joseph B. Eastman, Director of the Office of Defense Transportation. The revised order, establishing a more flexible standard for conservation of such transport equipment, takes effect August 1.

The ODT announced at the same time that a provision of the original order requiring trucks to be loaded to at least 75 per cent. of capacity on return trips has been canceled. Similar provisions in General Orders ODT 4 and 5, governing operation of trucks by contract and private carriers in over-the-road service, also have been canceled. Revisions of these orders are to be issued shortly, the ODT announced.

Under General Order 3, as revised, all trucks affected by the order must carry a capacity load over a "considerable portion" of the trip out or the trip back.

Trucks may be operated by common carriers with less than a capacity load or empty over a portion of the trip out or back only if, after exercising "due diligence" as defined by the order, the owner or driver is unable to comply with the requirements of the order.

The exercise of "due diligence" will include checking with Joint Information Offices being established in various cities pursuant to General Order No. 13 or checking with other carriers individually, in the event there is no such service available, in an effort to obtain a load.

Only when all efforts to obtain a load and to lease a truck to another carrier have failed, may a truck be operated empty or patrially loaded over a part of the outgoing or incoming trip.

In attempting to obtain a load for a truck, the owner or his representative is not required to take any action that would not be "consistent with prior commitments involving the use of the truck *en route.*"

Another major revision limits trucks operated by common carriers in over-the-road service to a maximum speed of 40 miles an hour as a means of saving tires

and prolonging the life of engines and running parts.

As in the original order, the capacity of a truck is to be determined by the load-carrying ability of the tires, less the weight of the truck. The rated load-carrying ability of all types of truck tires, as well as passenger car tires used on trucks, is set forth in an appendix to the order.

No truck affected by the order will be required to be loaded to such an extent that the gross weight will exceed the safe capacity of any bridge or other structure *en route*, as determined by state or local regulations, or the maximum gross weight limitations of any state in which the truck is operated.

Loading requirements and limitations on gross weights will not apply to special equipment. The limitation on gross weights, applying to all other trucks except tank trucks and farm trucks, has been set, as in the original order, at 120 per cent. of the rated load-carrying ability of the tires.

Tire Quotas for August. — Larger tire and tube quotas for August than July have been allotted to provide for increasing applications by essential vehicle operators for rationing certificates, the Office of Price Administration announced July 24.

The quotas for trucks, buses, farm tractors and other heavy vehicles have been increased partly in accord with the seasonal pattern, partly in response to evidence of increasing need on the part of eligibles. The new tire quota for August is 316,695 against 268,925 for July, while the allotment of recapped tires or recapping services is 355,883 against 314,896, and the tube quota is 347,696 compared with 299,265.

Passenger-car tire quotas for the states and territories total 58,308 new tires for applicants on List A, which includes the most essential services, 87,860 Grade II new tires for a special war worker classification, 637,959 recapped tires or recapping services, and 418,910 inner tubes. July quotas were 57,097 new for List A, 23,402 Grade II, 555,077 recaps and 323,087 tubes.

The reason for the sharp increase in the Grade II quota is that the July allotment of tires of this kind was for only the last half of the month. The amendment to the rationing regulations which makes Grade II casings available to a restricted classificaion of war workers did not become effective until July 15. The expanded recap quota also reflects, in large part, increasing employment in war occupations which make workers eligible for tires.

Tire Restrictions.—Only trucks engaged in services essential to the War effort or public health and safety will be entitled to recapped or new tires after July 28 under a drastic revision of the tire rationing regulations announced July 20 by the Office of Price Administration.

The revision, which was necessitated by increasing evidence that quotas will not provide for the needs of all those on present eligibility lists, will cut off from tires all privately operated trucks carrying luxury goods, unless the transportation of such things is only incidental to the main service performed by the vehicle.

Besides the categorical exclusions from eligibility, the revision gives local War Price and Rationing Boards authority to winnow applications received from eligibles under List A, which includes the most essential transportation functions. After the change in the regulations becomes effective, trucks, transporting raw materials, semi-manufactured or finished goods, including farm products and foods, will be recognized as eligible for tires only if the services they perform are essential to the war effort or public health and safety. Heretofore, trucks transporting commodities of that kind could be denied tires only if the applications before a board were in excess of its quota.

These regulations do not apply to common carriers, which still may carry the goods which private carriers no longer may move, except as an incidental part of their operations, on rationed tires.

The owner of a truck performing an essential transportation service not provided for in the List A eligibility classifications of the regulations may file an application for a certificate for recapped tires under List B (which includes services deemed essential by the local board but not provided for in List A) up to the 20th day of any month. If the board still has any recapped quota left, it may issue such certificates after the 25th of the month.

The reduction in the truck eligibility list is accomplished by Amendment No. 22, effective July 28, to the Revised Tire Rationing Regulations.

Tractor Parts.—Production and distribution of repair parts for track-laying tractors were placed under restrictions July 7 in order to assure an adequate supply for essential uses. At the present time, due to uneven distribution, there is a shortage of certain repair parts for track-laying tractors being used on essential projects, such as ordnance plants, Army and Navy airports, cantonments, Defense Plant Corporation projects, and mining, logging and agricultural operations closely related to the war program.

Under Supplementary Limitation Order L-53-b, producers are prohibited from manufacturing, during the period from July 1, 1942, to June 30, 1943, more repair parts than 50 per cent. of the total value, as expressed in terms of manufacturer's cost, of their entire production during 1941 of track-laying tractors and repair parts combined.

Sales of spare parts by producers are restricted to the Army, Navy and Maritime Commission, authorized distributors or dealers located within the United States or Canada.

The order also provides that distributors and dealers must obtain, before making any sales of repair parts to any person, a statement of the type of track-laying tractor to be repaired, the purpose for which it is to be used, and the minimum quantity of parts necessary to put the equipment in serviceable condition. Distributors and dealers are prohibited from delivering more parts than are necessary to meet a person's minimum requirements. They must give preference to purchase orders for certified minimum requirements necessary to repair equipment to be used on war projects, which include any construction project undertaken by the Army, Navy, Maritime Commission or Defense Plant Corporation or any construction project granted a preference rating higher than A-2 under any order in the P-19 series.

Trailer Manufacture Stopped.—The War Production Board on June 25 ordered a halt to production, effective July 1, of commercial-type truck trailers for non-military use. No manufacturer will be permitted to produce any truck trailers having a load-carrying capacity of 10,000 pounds or more, except for the Army and Navy, certain designated government agencies, governments of the United Nations and for deliveries under the Lend-Lease Act.

Restrictions contained in the order do not apply to third-axle attachments, which have performed valuable services as substitutes in relieving the shortage of heavy trucks. Application of a third axle to a two-axle truck substantially increases the load capacity.

The stop-production order covering commercial-type truck trailers is contained in Supplementary Limitation Order L-1-g, which also removes buses from the terms of orders in the L-1 series.

Trucks for Mining.—The War Production Board on July 24 cleared the way for the manufacture of not more than 500 large "off-the-highway" trucks for use by mining and other essential industries and for export.

An "off-the-highway" truck is defined as a "motor truck, truck-trailer, and/or trailer operating off the public highway, normally on rubber tires and especially designed to transport material, property or equipment on mining, construction, logging or petroleum-development projects."

Production of such trucks was stopped May 31, 1942, by the War Production Board.

There are about 35 firms which normally produce the custom-built, heavy-duty trucks that range in gross weight from 40,000 pounds to more than 100,000 pounds, mounted on from 7 to 10 wheels.

This order, Amendment No. 1 to Supplementary General Limitation Order L-1-E, provides that the industry may manufacture between July 1 and December 31, 1942, a maximum of 500 of the trucks for essential civilian and indirect military requirements. The order specifies, however, that quantities and types any firm may manufacture within that allotment must be authorized by the Director General for Operations.

EDITORIAL

"Rugged Individualism" Will Not Win the War

WHEN it was announced some weeks ago that the organization of the War Production Board was to be changed with the view of increasing war-material production, hope was general that the administrative machinery behind our making of equipment needed for the winning of the war would thereafter be able to cope with the conflicts between private and public interests which had constituted one of the greatest obstacles to unified all-out effort. When the changes were at last described it became apparent that the "reorganization" was little more than a realinement and that those charged with responsibility for prosecuting the war had been shifted about with little, if any, real alteration in their powers and aims. Because the Army and Navy appeared to have acquired greater control over production and allocation, many business men found the new set-up "disturbing". Because business representatives on the WPB seemed to have relinquished none of their powers, despite the new face put on things, the average man finds the new arrangement "disquieting".

Recently the WPB curtailed the expansion of steel-production facilities which had been ordered after months of delay. According to Senator Harry S. Truman's testimony before the Gillette Committee, "Controlled production is trying to find safety for monopoly after the war", in steel, as in aluminum and copper. In the opinion of Senator Joseph C. O'Mahoney, the big steel companies absolutely control the policies of the WPB. The attitude of the board toward the development of the sponge-iron process for steel production is revealed by a letter written by W. L. Batt, director of materials for the WPB, who said that the board's experts had investigated all the sponge-iron processes and that all but one had been "discarded as impossibilities". And, "even in this case", he added, "no great hopes are entertained". Yet, the Bureau of Mines, through its director, R. R. Sayers, has said that "commercial sponge-iron plants should be installed with a minimum of delay in order that the quantity and quality of the nation's steel production will not be lessened because of the shortage of scrap". He stated this as the opinion of the bureau "and other government agencies concerned with essential materials for the prosecution of the war". But the WPB has continued its opposition to the process: "There is plenty of evidence that it is being suppressed", says Senator Truman.

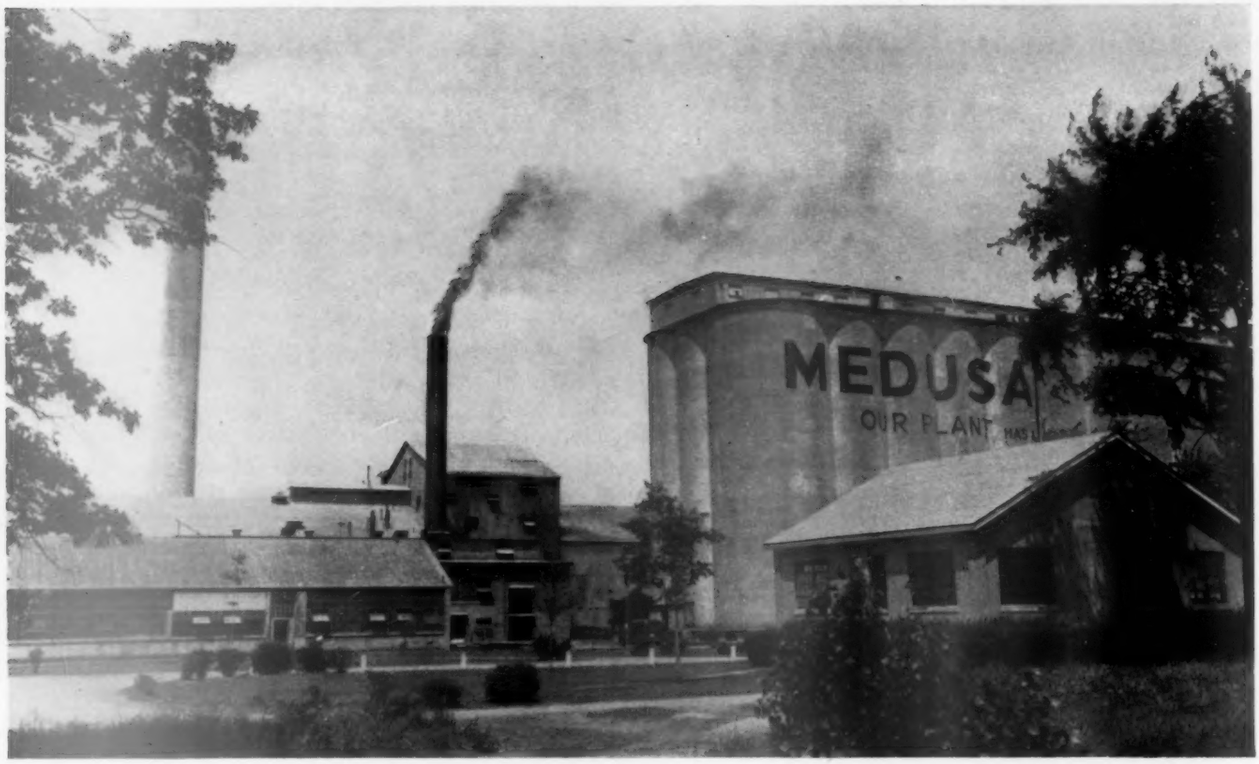
While the shortage of scrap iron is curtailing the production of steel, we are making no use of a process which makes possible the production of high-grade iron, ideally suited to the production of steel, from low-grade ore and at a cost $5 per ton less than that of the common method. Sponge-iron plants can be built in units small enough to justify their erection at the "mouth of every iron mine" in the country. The steel companies are said to oppose the adoption of the process because the resulting decentralization of production would "tend to destroy the concentrated control which has been built up over half a century in the iron-and-steel industry".

Several months ago Henry J. Kaiser, prominent west-coast sand-and-gravel producer and a builder of dams and ships, attempted in vain to get approval from the WPB to build a sponge-iron plant but was later given approval to build a plant using the traditional pig iron and scrap iron. A similar attempt was made by persons in Missouri, but it was checked by a steel-company representative on the WPB who said that there was no more chance of those iron-ore deposits being utilized than there was for a snowball in hell, according to Senator Bennett Champ Clark. The Senator charged that there are "certain men" in the WPB "who, by reason of former affiliations, are not interested in bringing into production facilities which, when the war is over, may compete with the organizations with which they have been affiliated".

This is the type of thing that hampers the development in America of the utmost in production and in civilian morale. Wherever Germany succeeds, on the firing line or on the production line, it succeeds because there is no place in the Nazi system for the dominance of private interest as opposed to the nation's war aims. Can one imagine German steel makers telling those responsible for German steel production what processes should be used? Can one imagine the German automotive industry stalling for a year its conversion to the production of war material? Can one imagine Germans being denied the use of fluorescent lighting because it would reduce the average householder's consumption of electricity?

THIS war will not be won as quickly or as cheaply as it should, if we continue to entrust the production of war *materiel* to persons whose private interests stand to be adversely affected by unselfish devotion to the common welfare. "No man", says the report of the Truman Committee, "can honestly serve two masters". This is not due to lack of integrity as much as to habitual preoccupation with selfish interests. Men long accustomed to judging every action in terms of its effect on their own or their companies' interests can not generally be expected to assume and to discharge impartially the responsibilities of public office.

Many of the forms of greatness for which America stands as a symbol before the world are attributable to the spirit of individualism that has dominated its growth. But individualism, especially when of the type described as "rugged", may become the very antithesis of the liberty it proclaims, if it asserts its right to place individual interest above public good. That tendency, too evident in recent months, must be permanently checked, if the love of liberty we profess is to be more than a mere mouthing of meaningless words.



A partial view of the plant at Silica, Ohio, with storage silos at right and plant office building in right foreground.

Slurry Filters, Other Improvements Modernize Medusa's Plant at Silica

THE Medusa Portland Cement Company recently climaxed a long series of improvements to its plant at Silica, Ohio, by the installation of slurry filters on its kilns and the reconstruction of its finish-grinding department. In previous years about everything possible had been done to bring up to date other departments of this 20-year-old wet-process plant. As it now stands this plant compares favorably in efficiency and in the quality of its products with any in the industry. All these improvements were made primarily to increase efficiency and only the filter installation has materially increased the capacity of the plant. These various important improvements will be described in this article in the order of their occurrence in the flow-sheet of the plant.

In 1941 a new Bucyrus-Erie 20-B gasoline shovel with a ¾-cubic yard dipper was purchased for loading clay in the combination clay, shale and limestone quarry a mile north of the plant. A White Super Power truck with a 16-ton Truck Engineering Corporation end-dump body was added to haul the clay to the plant. The stone and shale are still hauled to the plant by railway. The limestone quarry has a 25-foot face and is a massive formation. Well-drills were used for primary drilling and considerable secondary blasting was necessary. Ingersoll-Rand wagon-drills are now used for primary drilling and much better breakage is being obtained.

About 12 years ago the raw-grinding department was improved by replacing one of the three Compeb mills with 2 Kominuters in closed-circuit with Tyler Hum-mer screens. This resulted in some increase in capacity and improved the slurry fineness. The increased fineness is believed to have improved the expansion test (autoclave) and to have aided in the finish grinding.

About 5 years ago Manitowoc Vanderwerp recuperators were installed on the three 10- by 150-foot rotary kilns and a year later 40-inch Raymond direct-firing coal mills replaced the original coal-preparation department. These installations are credited with the production of a much higher grade of clinker, and have made possible much closer control of kiln operating conditions. The recuperators also are said to have helped to improve the expansion test by their quick-quenching action on the clinker and the cooler clinker obtained has resulted in a cooler cement for shipping. The coal mills are grinding to a fineness of 80 per cent. through 200-mesh.

Even better results were obtained after the installation late in 1941 of Eimco slurry filters on these kilns. Two filters actually went into operation at that time and the third, although installed, has not yet been put in operation. These are credited with having caused a considerable reduction in the fuel consumption per barrel of clinker produced. Slurry was formerly fed to the kilns with a moisture content of 35 per cent. and, because of its high shale

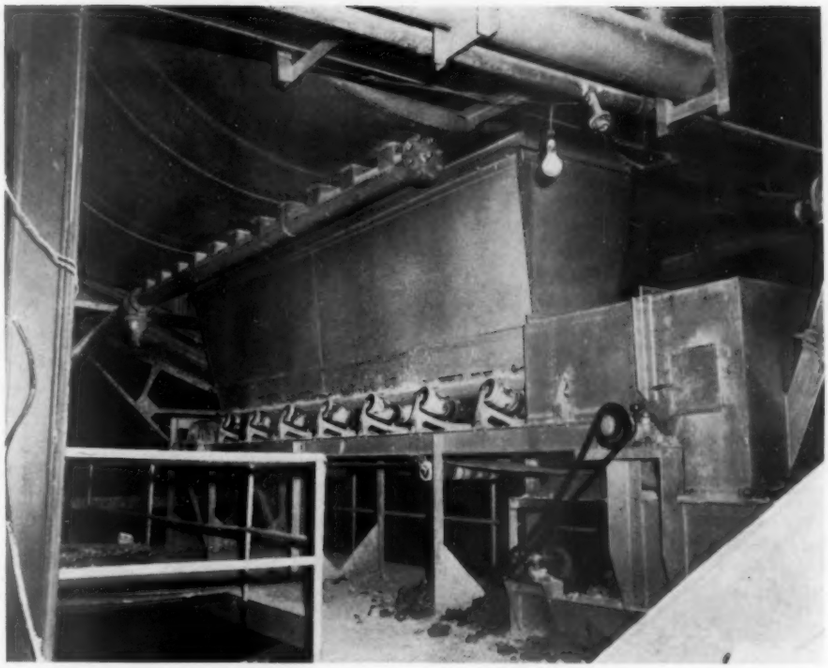
By W. E. TRAUFFER

content, was too stiff to be pumped efficiently. The filters have made it possible to increase the slurry moisture to 40 per cent. and yet produce the 18-per cent. slurry-filter cake which has proved to be best for the raw materials involved. The average mix used consists of about 80 per cent. limestone. The remainder is shale or clay or a mixture of both.

The slurry from the raw-grinding mills is pumped into four mixing tanks equipped with mechanical and air agitation. The blending is usually achieved in filling a tank and it is seldom necessary to blend between tanks. After a tank's contents

One of the three 11-disk filters which dewater slurry before it is fed to the kilns.

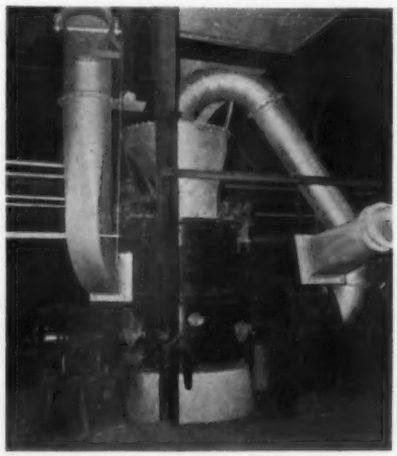
are analyzed and found satisfactory the slurry is pumped from it into three kiln-feed tanks which are interconnected so that a constant level is always maintained. Only one tank is emptied at one time and all the slurry is withdrawn from it before another tank is tapped. These tanks have a combined capacity of 3,000 barrels. All the handling of the slurry is done by Wilfley pumps.



View beneath one of the filters showing belt-conveyor to pug-mill. Dust chute at right.

Another 4-inch Wilfley pump feeds the slurry from these tanks through regulated orifices in a pipe to the Ferris-wheel feeders of the three Eimco slurry filters which in turn discharge it into troughs leading to the filter sumps. Each filter has 11 disks, each one of which is 12 feet in diameter and consists of 16 segments or bags. Each segment is of wood bound with steel and has channels for the water which is drawn out of the slurry through the filter cloth.

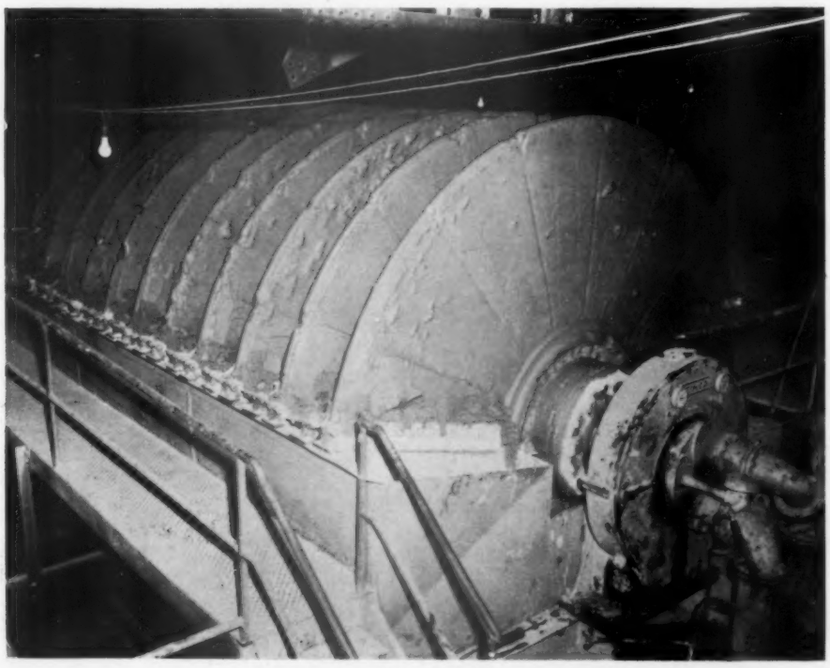
Each filter is driven through a Reeves variable-speed reducer by a



One of the three direct-firing unit coal mills.

3-horsepower motor which can be operated at any of four speeds by means of four external connections. This combination makes possible a range of speeds wide enough to meet any possible future conditions. An automatic electric-relay control varies the speed of the Ferris-wheel feeder and of the filter in accordance with the speed of the kiln.

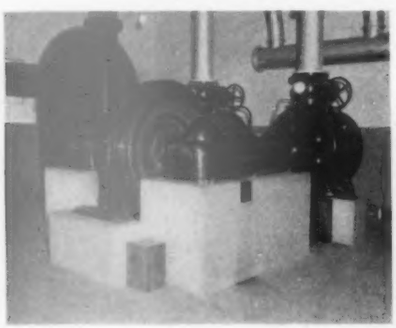
The suction for both filters now in operation is supplied by an Ingersoll-Rand 26- by 12-inch Type XRE compressor operated as a vacuum pump. This machine maintains a 25-inch vacuum and has sufficient capacity to serve also the third filter



Another view of one of the filters.

One of the short-plate recuperators which contribute to the efficiency of kiln operation.

Electric eye and constant-weight feeder which automatically control clinker feed to conical mill.



Compressor which creates vacuum for the filters.

when it goes into operation. An old Ingersoll-Rand vacuum pump is kept in reserve for an emergency.

The best results have been obtained at this plant with a 5/8- to 1/2-inch filter cake, which is obtained with the filter making one revolution every 20 minutes. The cake peels off well under these conditions and drops on a 24-inch belt-conveyor running under the filter for its full length. The cake is discharged from this belt-conveyor into a pug-mill, where it is broken up and thoroughly mixed with dust from the waste-heat boilers and flues. From the pug-mill the mixture passes through an insulated pipe into the kiln. Each kiln is equipped with lifters for 15 feet at its feed end and these prevent any damming or plugging up at that point.

This dust is collected from under the three waste-heat boilers by screw-conveyors which feed a cross screw - conveyor. This discharges the dust to three bucket-elevators, one for each filter, which in turn discharge to a cross screw-conveyor which is on the filter floor and runs in a direction opposite to that of the one below. From this screw-conveyor the dust falls into three hoppers from which screw-feeders discharge it into the feed ends of the pug-mills. The variable-speed d.-c. motors driving these feeders are controlled by rheostats and their speed is not varied with the kiln speeds. With this flexible system if any kiln is shut down, the dust from its boiler and flue can be fed to the other elevators or bins, and any other emerengcy can be taken care of. If necessary, the excess dust can be discharged from the end of the top screw-conveyor into a truck outside the building. This has been necessary only when the plant was shut down and the boilers were cleaned out.

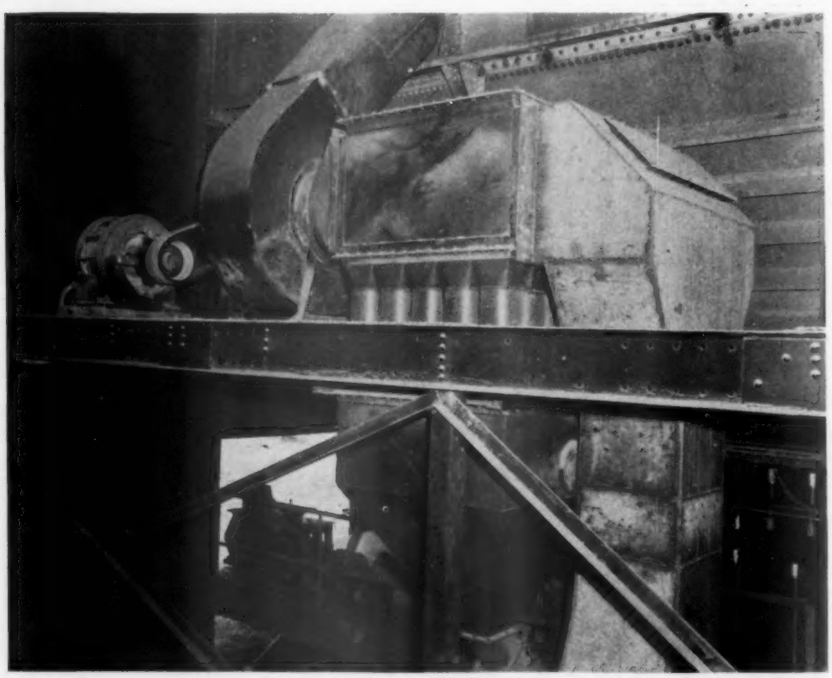
The clinker is discharged from the kilns into three 6- by 60-foot rotary coolers. In May, 1942, Western Precipitation Corporation Multiclones were attached to each of the coolers and these salvage most of the

This 18-foot mechanical separator operates in closed-circuit with the finish-grinding tube-mills.

dust that formerly went out of the cooler stacks. These are Type 9-VD, Size 30-5 units, specified for 15,000 c.f.m. at a temperature of 500 degrees F.

The clinker is discharged from the coolers at hand-held temperatures to the bottom strand of a Link-Belt Peck continuous-bucket carrier which receives also the dust collected by the Multiclones. This carrier takes the clinker outside the building under the outdoor clinker-storage pile, up through a supporting pillar and back over the clinker storage. The clinker can be discharged on the pile but, because of

(*Continued on page* 43)



One of the three collectors which reclaim dust from the clinker coolers.

Crude Silica-Sand Output Doubled to Meet War Demands of Foundries

The Ottawa crushing-and-screening plant as seen from an old mine entrance on the property. Underground mining was attempted instead of open-pit operations many years ago but was soon abandoned as impractical.

OUTCROPS of the St. Peter sandstone in the vicinity of Ottawa, Illinois, provide perhaps the finest quality of silica sand obtainable anywhere. Here, in an L-shaped area of approximately 36 square miles, the St. Peter formation is practically pure silica, the only important deleterious material being a small percentage of clay.

The origin of the St. Peter sandstone has long been a question of interest to geologists. Two theories have been advanced, the first explaining the formation as having

By HARRY F. UTLEY

once been a great desert of drifting sand before burial, the second considering the sandstone as a sedimentary deposit essentially marine in origin.

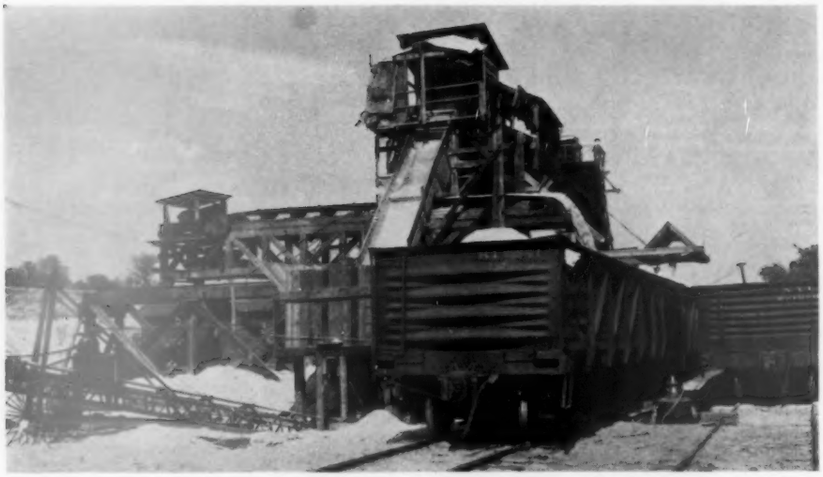
The stone is readily broken down to grain size, the grains being rounded in shape in contrast to angular silica sands produced almost everywhere else. The clay occurs principally as an interstitial filling, coating and binding the grains together. The binder is of such a nature that, in any fracture of the material, the fractures go around the grains rather than through them, and thereby preserve the round uniform grains for which this district is noted. The material is found mainly in the bluffs along the Illinois and Fox Rivers and varies from almost pure white to buff and yellow in color.

The various producing companies in the Ottawa district turn out crude sand, washed and dried and ground sands, or both. The crude sand is sold almost entirely to steel foundries as molding sand and for core-making. The washed and ground material has many uses in the chemical, processing and manufacturing industries, glass manufacture being of primary importance.

This article deals with the crude-sand phase of the operations, more specifically those carried on by the American Silica Sand Company, said to be the largest exclusive producer of crude silica sand in the United States. It operates three pits and plants designated as (1) the Ottawa pit, (2) the Reynolds pit, and (3) the Higby Canyon pit. During the 1941 season the com-

A view of the Ottawa pit showing train of dump cars and shovel. Note the extreme thickness of the overburden.

This is the Reynolds pit, material being transported to the plant around the cliff by a system of belt-conveyors.



Car-loading end of the Ottawa plant showing shuttle loading belt.

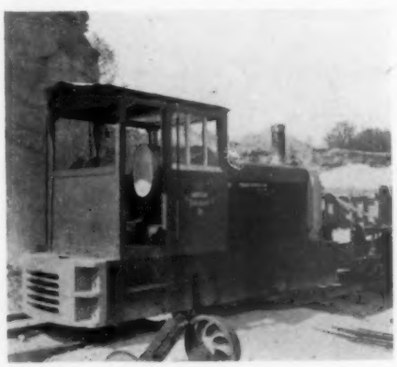
pany shipped 426,989 tons of crude sand to foundries and, in response to an urgent appeal from the War Production Board, this year expects to more than double this output. Much of this estimated 900,000 to 1,000,000 tons will go to steel foundries turning out the implements of war.

Ordinary molding sand is not satisfactory for making steel castings since its sintering point is too low for the higher temperatures encountered in molten steel. The crude sand sold by the American Company has a high sintering point—2,766 degrees F.—and the small amount of clay present is augmented

The primary jaw crusher

by additions of bentonite, molasses and flour at the foundries to supply the proper bond. The rounded grain structure, too, assures better permeability, the property which allows the venting of gases in the mold when the steel is poured.

Seven grades of sand are produced by the company as shown in the table. The deposits at Higby Canyon and in the Reynolds pit are relatively soft, while those at the Ottawa pit are harder and require considerably more processing. Since the operations at the first two pits are simplifications of those carried on at the Ottawa pit, the operating



The 12-ton gasoline locomotive.

methods at the latter only are described here.

The deposit at the Ottawa pit is overlain with burden which runs up to 38 feet in thickness and includes, besides topsoil and loam, strata of yellow and blue shale, fire clay, and a seam of third-vein bituminous coal which varies from 18 to 26 inches in thickness. The dense overburden is blasted out, the coal is sold to local mines, and all the spoil is excavated by a 2-cubic yard Marion Hesselman-engine-powered dragline. Dump trucks carry the material to a worked-out section of the pit.

A new Bucyrus-Armstrong well-drill is going into service this summer replacing an older model. This machine and several Ingersoll-Rand

Two sets of rolls which reduce much of the material to grain size.

and Chicago Pneumatic sinkers are used to drill the deposit preparatory to blasting. Blasts are detonated at frequent intervals, every ten days or so, to prevent weathering and contamination of the raw material. Trojan explosives are used and an Ingersoll-Rand compressor driven by a 40-horsepower motor supplies air for the drills.

The blasted sandstone is loaded by a Marion 1½-cubic yard Diesel-powered shovel into dump cars which operate over 36-gage track and are drawn by a Whitcomb 12-ton gasoline locomotive. The cars discharge over a rail grizzly into a receiving hopper near the plant, large pieces being sledged through the bars, which are spaced 11 inches apart. An attempt is made to have a reserve supply of at least 200 tons in the hopper at all

TYPICAL ANALYSES OF SEVEN TYPES OF CRUDE SAND PRODUCED BY THE AMERICAN SILICA SAND COMPANY

Percentage Retained on Sieve No.	Reynolds Pit			Higby Canyon Pit			Ottawa Pit
6	0.0	0.0	0.0	0.0	0.0	0.0	0.0
12	0.0	0.0	0.0	0.0	0.0	0.0	0.0
20	0.1	0.0	0.2	0.1	0.2	0.0	0.2
30	2.8	2.0	1.2	3.7	2.8	0.5	0.0
40	40.2	27.6	18.4	41.4	34.9	7.9	44.0
50	28.2	28.3	27.5	29.8	26.0	24.7	25.7
70	13.3	16.1	18.2	10.7	11.4	20.1	12.0
100	7.8	9.7	12.4	5.7	7.2	17.3	6.0
140	3.7	7.9	12.1	1.9	6.9	18.6	2.5
200	1.5	4.5	5.1	2.4	5.5	5.5	1.0
270	0.7	1.4	1.9	0.3	1.7	0.9	0.3
Pan	0.4	0.9	0.7	0.4	1.2	1.3	0.5
A.F.A. fineness number	45.0	55.4	61.1	43.0	55.0	68.7	41.8
Percentage fines	2.6	6.8	7.7	3.1	8.4	7.7	1.8
Percentage clay	1.3	1.6	2.3	3.6	2.2	3.2	1.8

Approximate sintering point 2,766 deg. F.

times, sufficient to keep the plant operating for more than an hour.

A Robins apron-feeder transfers the material from the hopper to 36-inch by 92-foot belt-conveyor

Vibrating screen which does the final sizing.

"A," which carries the pit-run product to the top of the processing tipple. Here the material is discharged over a 4-inch grate, the oversize going to a 24- by 36-inch Universal jaw crusher. The minus 4-inch material passing the grate bars and the crusher product are carried by belt-conveyor "B," 36 inches wide and 75 feet long between centers, to the top of the gravity-screening tower.

The gravity screens form the bottom of a steeply-inclined chute, 30 feet long and 33 inches wide, the screens being made up of special 5/16-alloy-steel rods. Cross bars resist the rapid movement of the material down the screening chute,

Workmen sledging oversize pieces through grizzly bars into the receiving hopper.

breaking much of it down to grain size. The chute also has a 2½-inch scalping section, the rejects from this section going to a set of 18- by 42-inch corrugated rolls set 1 inch apart. The oversize from the 5/16-inch slotted mesh is passed through a pair of closely-set 27- by 32-inch smooth rolls. Both sets of rolls are in closed circuit with belt-conveyor "B."

The throughs from the gravity screens are carried by 120-foot, 36-inch belt-conveyor "C" to the final-sizing screens, two Universal 42-inch by 5-foot vibrators arranged in line. By the time the silica sand reaches these screens it is largely broken down to grain size and the pieces rejected are those grains which are cemented too firmly together to be worth reprocessing. These oversize pieces are carried to a waste bin by a portable belt-conveyor and the throughs are ready for loading. Gondola cars are filled by a 36-foot shuttle belt-conveyor which moves on rails at right angles to the two parallel spur tracks, allowing either track or both tracks to be used for loading. A Stephens-Adamson electric car spotter moves the cars so they may be filled uniformly. No stock-piles are maintained, all the sand being loaded directly into the cars. At peak production 1,800 tons, or 32 carloads, are produced and loaded in an 8-hour working day.

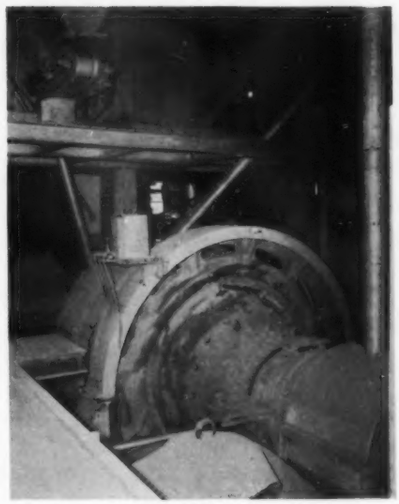
The American Silica Sand Company was formed in 1928 by a consolidation of 14 small independent producers operating in the Ottawa-Utica district. Charles J. Niesen, president since 1937, was general superintendent from the time the company was organized until he became its head. He is a pioneer in the district, having been in charge of operations for the old Reynolds Sand Company since 1914.

The company operates all its plants in the spring, summer and fall, and one plant the year 'round. Its three plants are served by the Rock Island and Burlington Railroads. Shipments are made to both coasts, into Canada, and to a few sections of the South.

John W. Waters is now general operating superintendent for all the plants. The foremen at the three plants are: Ottawa, Thomas Ruyle; Reynolds, Leo Bray; Higby Canyon, Albert Wilkinson.

Medusa (from page 40)

its low temperature, it is now usually carried back into the building where it is discharged into the 1,000-barrel capacity feed bins of the two preliminary grinding mills in the finish department. The Peck carrier also, on occasion, receives clinker from the storage pile for discharge into these bins.



One of the two new conical mills used for the preliminary grinding of clinker. Gypsum feeder above.

Several years ago an 18-foot Raymond separator was installed in the finish-grinding department in closed circuit with two 7- by 22-foot tube-mills, and this equipment was used for finish grinding. A third tube-mill was converted into a preliminary-grinding ball-mill and operated in closed circuit with Tyler Hummer screens. This ball-mill has been replaced by two 48-inch by 9-foot diameter Hardinge conical mills which are operated in closed circuit with the screens.

The clinker is fed from the bins by Hardinge constant-weight feeders into the conical mills along with the required percentage of gypsum. The product of each mill goes by a separate elevator and screw-conveyor to a set of three Tyler Hum-mer screens which are equipped with 20-mesh wire-screen cloth. The plus 20-mesh material from each set of screens is returned by screw-conveyors to the proper Hardinge mill. Each mill is loaded with 2-, 3- and 4-inch steel balls and is driven by a 250-horsepower motor.

The minus-20-mesh material passing through these screens is carried by screw-conveyors into 500-barrel bins over the two 7- by 22-foot tube-mills which are located on opposite sides of the building. Each of these mills is supplied by a Fuller rotary feeder. Their products are carried by screw-conveyors to a common elevator which feeds the 18-foot Raymond separator. The rejects are fed back into the tube-mills by means of a series of screw conveyors.

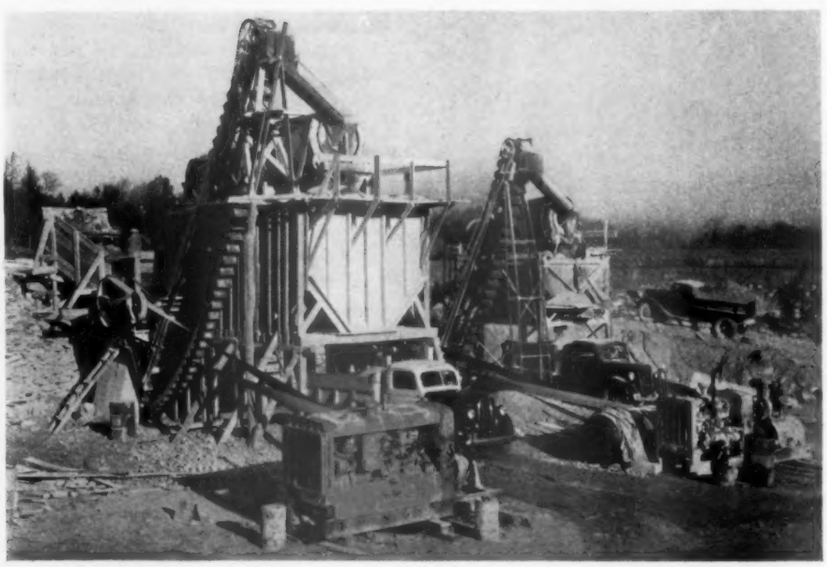
The product of the separator is finished cement which goes to a Fuller-Kinyon Pump that transports it through a 4-inch line into the cement-storage silos.

Operating Views as Caught by the Camera

A gypsum deposit being worked by the Pretoria Portland Cement Company in Cape Province, South Africa, is shown above. The Le Tourneau scraper and rooter, drawn by a Caaterpillar tractor, are used to strip the overburden as well as excavate and haul the raw gypsum to stock-piles.

ABOVE—An airplane tripper, powered by Westinghouse gearmotors, picks up aggregate from a belt-conveyor and delivers it, according to size, to the proper storage pile below for use in making the concrete for Shasta Dam in California. BELOW — A Bucyrus Erie shovel loads a Dodge truck in the pit of the Service Rock Company, Riverside, California. The gravel, destined for defense work in the building of March Field, is hauled in 12-ton loads although the truck is rated at only 3 tons.

The Smith Materials Company of Camp Hill, Pennsylvania, took 338,000 tons of stone during the latter half of 1941 from the Chamberlain quarry, pictured below, located near Ovid in central New York. Two Koehring Dumptors and a Lorain shovel are seen at work.



These twin Pioneer crushing-and-screening plants, owned by R. H. Waters of Elizabethtown, Kentucky, produce 800 to 1,000 tons of material for road work daily. Each is driven by a Caterpillar Diesel engine.

Magnesia Sources and the Magnesium-Metal Problem

THE phenomenal increase in air warfare and the extensive use of incendiary bombs in the present war is raising magnesium metal from a position among the least important of the minor nonferrous metals to a position among the major nonferrous metals. When the present program of expansion of our magnesium-metal production is completed we will be producing more than twice as much magnesium metal as we were producing aluminum when the war started in 1939.

Magnesia in Refractories.—At the outbreak of World War I the magnesium-metal industry was in its infancy, and the world's supply came from Germany. Magnesia ores as a source of magnesium metal were of little interest.

Magnesia raw materials were used in large quantities, however, to produce magnesite refractories for lining metallurgical furnaces. The largest consumer of these refractories is the steel industry. Dead-burned magnesite was the only acceptable lining for open-hearth furnaces. The principal source of supply was Austria. The World War shut off this supply, and the United States suddenly became dependent on domestic magnesia-containing materials.

The only appreciable production of magnesite in the United States had come from California, but this was not as suitable for the manufacture of dead-burned magnesite refractories as was the crystalline magnesite from Austria, and the deposits were not capable of furnishing tonnages of the order of magnitude required by the steel industry. An extensive search for domestic deposits of magnesite led to the development of large magnesite deposits in the Chewelah district in Washington. The production from these deposits has progressively increased, whereas the importations have remained far below the pre-World War I tonnages. These changes in the sources of dead-burned magnesite used in the United States are shown in the following table:

U. S. Dead-Burned Magnesite Consumption

Year	Domestic (tons)	Imported (tons)
1913	2,400	173,000
1918	58,000	21,000
1938	83,000	25,000
1940	141,000	31,000

The domestic production from the Chewelah district has been further expanded since 1940.

The supply of dead-burned magnesite was so greatly curtailed during World War I that dead-burned dolomite was developed as a substitute to meet the deficiency. Because of its high lime content—dolomite contains nearly 1.4 times as much lime as magnesia — dead-burned dolomite is not competitive with dead-burned magnesite in quality and service. However, dolomite deposits are so numerous and so large in size that dead-burned dolomite can be produced in any desired quantities in the steel-producing regions of the United States. Inferior service is compensated for by much lower price. At first dead-burned dolomite was handicapped by instability due to slaking and dusting. These defects were gradually overcome, and the product was so greatly improved that dead-burned dolomite became a firmly established refractory for open-hearth use. The magnitude to which this industry has grown is attested by the production of 868,000 tons in 1940.

Not only did magnesite imports fail to recover after World War I, but dead-burned dolomite had so largely supplanted magnesite that the subsequent discovery of even larger magnesite deposits in the Paradise Range in Nevada attracted little interest on the part of the magnesite-refractory industry. A remarkable occurrence of brucite, magnesium hydroxide, discovered in the Paradise Range in 1927, contains over 3,000,000 tons of brucite. In 1930 it was recognized that the brucite was inclosed in a large deposit of high-grade crystalline magnesite with an estimated tonnage of 71,000,000, as compared with estimates of 3,000,000 tons at Chewelah. In 1937 the brucite began to be quarried on a small scale to produce high-magnesia refractories, but it was not until the magnesium-metal program was initiated in 1941 that production of magnesite was undertaken here. This magnesite will furnish the magnesia base for two of the largest magnesium-metal plants.

Magnesia from Dolomite.—Because of the scarcity of large magnesite deposits and their remoteness from the principal steel-producing centers of the world, the abundance and large size of dolomite deposits had for many years directed attention to them as a possible unlimited source of magnesia. Innumerable attempts have been made to devise commercially practicable methods of extracting the magnesia from dolomite. The only method that had come into extensive commercial use is the Pattinson method. The chemistry of the method is simple. When milk of dolomitic lime ($CaO.MgO$) is treated with carbon dioxide, the lime is precipitated together with the impurities as calcium carbonate, and the magnesia goes into solution as the bicarbonate $Mg(HCO_3)_2$. On boiling the clear magnesium-bicarbonte solution with steam the extra molecule of carbon dioxide is expelled, and very pure basic magnesium carbonate is precipitated. The reactions may be written in simplified form:

$$MgO.CaO + 3CO_2 + H_2O = CaCO_3 + Mg(HCO_3)_2$$

$$Mg(HCO_3)_2 = CO_2 + H_2O + MgCO_3$$

The cost of the process is much too great to make the product competitive with magnesite for refractory use and it has been employed only for insulation and pharmaceuticals.

The most promising method of extracting magnesia from dolomite at a cost to make it competitive with magnesite in refractories is what is known as the chloride method, but it has achieved little success and has not been used commercially in the United States. This is a two-step cyclic process. A suspension of dolomitic lime is treated with a solution of calcium chloride and carbon dioxide. The lime is precipitated as calcium carbonate and the magnesia is taken into solution as magnesium chloride. In the second step the clear solution of magnesium chloride is added to a suspension of dolomitic lime. The magnesia is

By JOSEPH T. SINGEWALD, JR.
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precipitated as magnesium hydroxide and the lime converted to calcium chloride for use in the first step. The chemical reactions (ignoring the hydroxides) are:

$$CaO.MgO + CaCl_2 + 2CO_2 = 2CaCO_3 + MgCl_2$$

$$CaO.MgO + MgCl_2 = CaCl + 2MgO$$

The precipitate of magnesium hydroxide retains so much of the calcium chloride, which has to be washed out of it, that the cost of the calcium-chloride loss has made the process too expensive to be competitive with magnesite for refractory uses.

Next in favor has been the sugar method. This also is a two-step cyclic process which uses sugar instead of calcium chloride. A sugar soution dissolves lime from milk of dolomitic lime, leaving the magnesia in solid suspension. The clear calcium-sucrate solution is treated with carbon dioxide to precipitate the lime as calcium carbonate and regenerate the sugar for use in the first step. The reactions may be written:

$$CaO.MgO + \text{Sugar} = \text{Calcium sucrate} + MgO$$

$$\text{Calcium sucrate} + CO_2 = CaCO_3 + \text{Sugar}$$

The sugar losses are too great, however, to make the magnesia product competitive with magnesite in the refractory field.

A number of other chemical methods have been worked out, but their commercial success has been foiled by the cost of the losses of the chemicals used as the lime dissolving reagent.

The only method that has achieved commercial success in the United States is the water-solution method. A plant using this method has been in successful operation for several years. This is also a two-step cyclic method in which the dissolving agent is water. Although both lime and magnesia are difficultly soluble in water, lime is so much more soluble than magnesia that the lime can be leached out of dolomitic lime and the manesia left in solid suspension. This method requires the use of large volumes of water, since it takes 1,000 parts of water to dissolve 1 part of lime. The clear lime solution is treated with carbon dioxide to precipitate the lime as calcium carbonate, regenerating the water for reuse in the dissolving step.

All these methods yield two solid products, magnesia and calcium carbonate, but in such proportions that for each ton of magnesia produced there is obtained 2.5 tons of calcium carbonate. Though precipitated calcium carbonate is a valuable product when it meets certain rigid specifications, the by-product calcium carbonate of these processes has hitherto been an unsalable waste, so that the entire cost of the processes has fallen on the magnesia product.

Magnesium-metal Production.—The world production of magnesium metal was exceedingly small prior to the outbreak of the war in Europe in 1939.

1938 World Production (tons)

Germany	14,000
United Kingdom	3,000
United States	2,400
France	1,800
Japan	1,500
Russia	1,000
Total	23,700
World total	24,000

Little is known concerning production expansions in the warring countries since 1938. The largest expansion must have been in Germany, and the British production has been greatly increased.

The trend of magnesium-metal production in the United States is shown in the following table:

U. S. Magnesium Production

	Production (tons)	Price (per lb.)
1914	none	....
1915	44	$5.00
1918	142	1.81
1938	2,400	.30
1940	6,250	.27

Until 1915 the small amount of magnesium metal consumed in the United States was imported from Germany. When the German supply was cut off by World War I, the Dow Chemical Company entered the field, but the demand for the metal increased so slowly that its output had reached only 2,400 tons in 1938. With the outbreak of the present war the Dow Chemical Company expanded the production of its Midland, Michigan, plant, and in 1940 had increased its production to 6,250 tons.

To meet the needs of our aid-to-Britain policy and our national-defense program a magnesium production of a new order of magnitude was planned, and a goal of 200,000 tons was set. These plans, representing the 1941 program of the WPB (then the OPM) and financed mainly by the Defense Plant Corporation, provided for the following magnesium-metal plants:

WPB Magnesium-Metal Program

	U. S. Aid	Tons of Metal
Dow Chemical Company, Midland, Michigan	.....	9,000
Dow Chemical Company, Freeport, Texas	$ 52,000,000	54,000
Permanente Company, Los Altos, California	9,250,000	33,000
Basic Ores, Las Vegas, Nevada	63,000,000	56,000
Mathieson Alkali Works, Lake Charles, Louisiana	16,000,000	18,000
International Agricultural Chemical Company, Austin, Texas	12,317,000	12,000
Diamond Alkali Company, Painesville, Ohio	16,000,000	18,000
Totals	$168,567,000	200,000

A second plant by the Permanente Company was tentatively decided on in connection with the Bonneville, Washington, power project.

When the United States became a belligerent, this program was considered inadequate, and a still further expansion to about 360,000 tons is under way.

Methods of Producing Magnesium Metal.—There are two general methods of producing magnesium metal: (1) the electrolytic method, and (2) the thermal-reduction method. The electrolytic method recovers the metal from magnesium chloride. The thermal-reduction method recovers the metal from magnesium oxide. The electrolytic method is the tried-and-proved method whereby most of the magnesium metal thus far produced has been made. The thermal-reduction method is still in the experimental and uncertain stage. The relative use of these two methods is:

Country	Electrolytic %	Thermal-Reduction %
Germany (production)	100	..
England (production)	90	10
United States (program)	83.5	16.5

Electrolytic Processes.—There are two electroytic processes in use: the wet method and the dry method.

In the wet method magnesium chloride is separated from an aqueous solution by crystallization. The product of crystallization is the hexahydrate $MgCl_2.6H_2O$. This has to be converted to anhydrous $MgCl_2$ for use in the electrolytic cells. This is the method that has been used by the Dow Chemical Company and which will be used at most of the plants under construction here.

In the dry method anhydrous $MgCl_2$ is made by treating magnesium oxide with chlorine and carbon monoxide, a reaction which yields the anhydrous chloride and carbon dioxide. This is the method used in Great Britain and which will be used at the Las Vegas plant.

The major item of cost in the electrolytic processes is electric power. The requirement is about 10

to 15 kilowatt-hours per pound of metal. Hence, an electrolytic plant can be located only where an abundant supply of cheap power is available. Since calcium chloride fouls and clogs the electrolytic cells, increasing power consumption, the specifications for the magnesium chloride are that the calcium-chloride content shall be less than 5 per cent.

Thermal-Reduction Methods.—The thermal-reduction methods likewise fall into two groups: (1) those in which the reducing agent oxidizes to a gas, and (2) those in which the reducing agent oxidizes to a solid product. The reducing agent in the first group is some form of carbon, and the process is known as the carbothermic method. The preferred reducing agents in the second group are silicon or ferrosilicon, and the process is known as the ferrosilicon method.

The Carbothermic Method.—The electrothermic method using carbon as the reducing agent has received more attention than any of the other thermal-reduction methods. The chemical reaction is simple:

$$MgO + C = Mg + CO$$

Its technical application is extremely difficult and its operation extremely hazardous. The furnace charge yields two gases, magnesium-metal vapor and carbon monoxide. The magnesium-metal vapor distilled from the electric furnace must be cooled and condensed to the solid phase. The reducing reaction is reversible before the metal vapors are condensed, so that cooling has to be done with extreme rapidity to prevent the reoxidation of the metal. This cooling must be accomplished so rapidly that it is called "shock cooling." The product of this first condensation is finely-divided metal. This has to be redistilled and condensed to obtain ingots of magnesium metal. All these operations must be conducted in a highly-reducing atmosphere because of the readiness with which the magnesium metal reoxidizes.

This method, named after its inventor, Hansgirg, was first put into commercial operation at Radentheim in Austria. The reducing atmosphere was provided with hydrogen gas. Disadvantages of the method are the high cost of the hydrogen gas, the difficulty and expense of recovering the hydrogen for reuse, and its great explosion hazard. The Radentheim plant was destroyed by an explosion in 1939. A second plant erected in Great Britain was likewise destroyed by explosion. A third plant was recently erected in Korea for Japan.

The Hansgirg method is being used at the Permanente plant in California with the modification of using natural gas instead of hydrogen gas to provide the reducing atmosphere and to produce the "shock cooling." The recovery and regeneration of the natural gas is obviated by using it to fire the kilns at the Permanente cement plant. At the Permanente plant calcined Nevada magnesite is briquetted with petroleum coke and reduced in the electric furnace at a temperature of 3,650 degrees F. The metal vapor is "shock cooled" to 380 degrees F. in 0.001 second. The condensed powder is briquetted and redistilled at 1,400 degrees F., yielding ingot metal containing 99.97 percent. magnesium. The power consumption of the electrothermic methods is of the order of 10 kilowatt-hours per pound of metal, and the requirements of the Permanente plant are 100,000 horsepower, or one-third as much power as is consumed by the entire city and county of San Francisco. The hazard of the method is shown by the fact that the plant has already suffered four explosions.

A still further modification of the Hansgirg process has been developed at the United States Bureau of Mines Experiment Station at Pullman, Washington, in which petroleum mist is substituted for hydrogen gas. One gallon of atomized oil is equivalent to 700 cubic feet of hydrogen. The oil is cheaper than hydrogen, and its recovery and regeneration are cheaper and simpler.

The Ferrosilicon Method.—Simpler than the carbothermic processes is the ferrosilicon method. The chemical reaction written in simplified form with silicon as the reducing agent is:

$$2Mg + Si = SiO_2 + 2Mg$$

In this reaction the product of oxidation remains in the furnace in the solid phase and the only gas phase generated is the magnesium-metal vapor. However, the power consumption is high even when the operations are conducted in small induction furnaces. The requirement of about 0.75 pound of the expensive reducing agent, silicon or ferrosilicon, per pound of metal, instead of the relatively cheap carbon, adds materially to the costs. The process has been used on a small scale in Great Britain but has been regarded as unsuitable for large-scale production.

In both the carbothermic reduction and the ferrosilicon reduction in the electric furnace the power costs necessitate that the magnesia base should be quite pure, and the specifications require a lime content of less than the equivalent of 3 per cent. on a carbonate or magnesite basis.

Recently a modification of the ferrosilicon reduction method generally referred to as the Pidgeon process, has been approved by the National Research Council. It requires neither a high-magnesia base nor a large electric-power supply. Several plants are now under construction to utilize this new method, in which the magnesia raw material is charged with ferrosilicon in an externally-heated vacuum retort and the magnesium distilled into a condenser. The raw material may be dolomite or even the magnesium-silicate rock dunite (Mg_2SiO_4). The reaction may be written in simplified form using dolomite and silica:

$$2CaO.MgO + Si = 2CaO.SiO_2 + 2Mg$$

The calcium silicate remains in the retort. With ferrosilicon the solid residue will contain both calcium silicate and calicum ferrite. Whether this method will prove economically competitive with the electrolytic methods remains to be demonstrated.

Sources of Raw Materials.—The required raw materials for the magnesia-refractory and magnesium-metal industries include, therefore, magnesium-containing and chlorine-containing substances.

The available magnesium-containing substances are:

1. Magnesite ($MgCO_3$) 28.5 per cent. Mg.
2. Some salt deposits and brines ($MgCl_2$) under 4.6 per cent. MgO.
3. Sea water ($MgCl_2$) 0.14 per cent. Mg.
4. Dolomite ($MgCO_3.CaCO_3$) 13.0 per cent. Mg.
5. Dunite and other magnesium silicate rocks ($2MgO.SiO_2$) 34.3 per cent. Mg.

The available chlorine-containing substances are:

Salt deposits and brines (NaCl) 60.6 per cent. Cl.

All these substances are being used singly or in combination to meet the greatly-expanded demand for magnesia refractories and magnesium metal created by our war program. They are available in adequate quantities to supply the needs of a program of any magnitude. The limitations of such a program rest solely in suitable plant capacity and

not in the scarcity or inadequacy of raw materials.

Magnesite.—It has been explained that there are only two known magnesite occurrences in the United States of sufficient tonnage to supply magnesium-metal plants. It is planned to erect a carbothermic plant using the Bureau of Mines modification of the Hansgirg process in connection with the Bonneville power project and utilizing the Washington magnesite as the magnesium source. The Washington magnesite has been hitherto used solely for the manufacture of dead-burned magnesite refractory.

Nevada magnesite will be used at Permanente's California plant and at Basic Ores' Nevada plant. The Permanente plant employs the Hansgirg electrothermic process. The Basic Ores plant will use the dry electrolytic process and will produce anhydrous magnesium chloride by treating calcined magnesite with chlorine gas.

Brine and Dolomite.—Brine and dolomite is the combination used at the Dow Midland plant. At Midland are available a calcium chloride and magnesium chloride containing liquor with 3 per cent. $MgCl_2$. Originally magnesium chloride was obtained from this liquor by fractional crystallization, but due to the prior separation of the double salt, tachyhydrite ($CaCl_2.2MgCl_2.12H_20$), only about half of the magnesium-chloride content of the liquor was recovered as magnesium chloride. A complete recovery of the magnesium chloride with an additional amount derived from dolomite was later achieved by treating the brine with dolomitic lime and carbon dioxide. This precipitates all the lime as calcium carbonate and leaves only magnesium chloride in solution. The reaction is:

$$CaCl_2 + MgCl_2 + MgO.CaO + 2CO_2 = 2CaCO_3 + 2MgCl_2$$

This same combination will be used at the Austin plant of the International Agricultural Chemical Company, where the magnesium-chloride source will be the bitterns from the potash plant of its subsidiary the Union Chemical & Potash Company at Carlsbad, New Mexico. The bitterns contain 16 to 18 percent. $MgCl_2$.

Sea Water and Limestone.—Though sea water contains only 0.6 per cent. $MgCl_2$, magnesia has been successfully extracted from sea water since the early 1920's. Long before the present urgent demand for magnesia two plants on San Francisco Bay were extracting magnesia from sea water by treating sea water with lime and precipitating magnesium hydroxide. The reaction is:

$$Ca(OH)_2 + MgCl_2 = CaCl_2 + Mg(OH)_2$$

The Westvaco Chlorine Products Company began operations in 1923 with sea water. In 1937 it erected a new plant at Newark[1] to use the more concentrated salt-pan mother liquor resulting from the solar evaporation of sea water to produce common salt. This mother liquor contains 10 per cent. $MgCl_2$. The lime is obtained from oyster shells dredged out of San Francisco Bay. The plant produces less than 100 tons daily of a refractory-grade magnesia.

About 1926 Marine Chemicals Company erected a second plant which uses sea water and produces about 10 tons daily of 99 per cent. MgO for pharmaceutical use.

Sea water and lime made from dredged oyster shells provide the magnesia for the Dow Chemical Company's electrolytic - magnesium operations at Freeport. The magnesia is converted to magnesium chloride by treating it with a 10 per cent. solution of hydrochloric acid. The chlorine for the hydrochloric acide is derived from the magnesium-electrolytic cells and by the electrolysis of sodium chloride supplied by the Gulf Coast salt deposits. The first plant with a capacity of 18,000 tons of metal is completed, and a second plant with a capacity of 36,000 tons of metal is under construction.

Sea Water and Dolomite.—If sea water is treated with dolomitic lime instead of high-calcium lime, the magnesia yield is doubled. The reactions are:

$$CaO + MgCl_2 = CaCl_2 + MgO$$
$$CaO.MgO + MgCl_2 = CaCl_2 + 2MgO$$

This is the combination now employed in Great Britain as the source of its magnesium metal. Prior to the war the British magnesium industry used Grecian magnesite. When this supply was shut off by the war, the use of sea water and dolomite was resorted to.

None of the projected magnesium-metal plants under the WPB program are employing dolomite and sea water. However, a plant to produce magnesia for the manufacture of magnesite brick is being erected at Cape May, New Jersey, by the Northwest Magnesite Company, which is owned jointly by the Harbison-Walker Refractories Company and the General Refractories Company and is the operating company at the Washington magnesite deposits. The dolomite will be obtained from eastern Pennsylvania. The annual output will be 40,000 tons.

Solvay Process and Dolomite.—Another new and large potential source of magnesia results from a modification of the ammonia-recovery step in the Solvay process. As the Solvay process has been carried out in the past, the ammonia is recovered by treating the ammonium-chloride liquor with high-calcium lime. By substituting dolomitic lime for the calcium lime the magnesia of the dolomitic lime is recovered as a by-product. The two reactions are:

$$2NH_4Cl + CaO = CaCl_2 + H_2O + 2NH_3$$
$$2NH_4Cl + CaO.MgO = CaCl_2 + H_2O + 2NH_3 + MgO$$

This modification was recently introduced by the Diamond Alkali Company to produce a magnesia sludge for magnesia refractories. The sludge will provide the magnesia for the electrolytic-magnesium plant being erected at Painesville, Ohio, by this company. Another electrolytic plant that will provide its magnesia in a similar way is that of the Mathieson Alkali Works at Lake Charles, Louisiana.

Dunite.—For a decade dunite has been used in limited quantities as a refractory-furnace lining but with indifferent success. Though an alluring source of magnesium, the theoretical magnesium content being 34 per cent. and large tonnages of rock containing 29 per cent. magnesium being available, no commercially-successful method of extracting the magnesia had been achieved. It now appears likely that dunite may be used directly in the ferrosilicon-reduction method of manufacturing magnesium metal and also in the production of magnesium chloride for the electrolytic method by treating dunite with hydrochloric acid. These developments are still in the experimental stage.

Summary.—The old adage that "necessity is the mother of invention" is being proved in a striking way in the magnesia field under the urge of war demands. Despite the phenomenal increase in the demand for magnesia-containing raw mate-

(*Continued on page* 50)

[1][See Trauffer (W. E.). *Lime, Gypsum and Magnesite Produced from Sea Water and Shells at New Plant in California.* PIT AND QUARRY, May 1938, pages 42-63; and *Sea-Water Magnesite Plant Improved.* PIT AND QUARRY, April 1941, pages 45 and 47.—ED.]

Big Rock Stone Company Profits From Extensive Use of Welding

THE Big Rock Stone Company, operator of a quarry at Little Rock, Arkansas, is conserving metal for war production and cutting replacement costs for itself at the same time. This firm, long an exponent of reclamation and hard-surfacing welding, has a well-equipped shop, employing both arc and acetylene welding, under the capable management of Frank Stockett, master welder, whose work —some of which is pictured here— reveals exceedingly fine workmanship. Practically all parts subjected to impact and abrasion are restored, when they have become worn, by welding. Typical salvage jobs are portrayed.

Figure 1

Figure 2

Two power-shovel dipper teeth are shown in Figure 1, one as worn and the other after being restored to its "as-new" contour with a section torch-cut from an Amsco cast repointer bar and welded on with the new V-Mang welding rod. The progressive steps are illustrated in the sketch and this procedure is followed.

After localized heating with the torch (never over 300 degrees F. for 13 per cent. manganese steel) the repointer was welded on ⅛ to ¼ inch off the center-line of the tooth. A space equal to the diameter of the rod was left between the repointer and the tooth to provide penetration of the first beads. The bead was carried across the full width of the tooth, held to 1 inch wide and peened vigorously. Then the tooth was turned and the other side started in the same way. Several beads were applied and peened on each side alternately until the tooth and the repointer were flush.

Mr. Tracy, general superintendent of Big Rock, reports that the tooth reclamation is accomplished at about one-fourth the cost of a new tooth and that the service life of rebuilt teeth is even greater. This is no doubt due to the work-hardening or peening that occurs during the welding operation. At the same time the high alloy analysis of the welding rod probably plays a part in extending the service life of the repointed teeth.

Mr. Stockett is pictured on a 4½-cubic yard power-shovel dipper front of 13 per cent. manganese steel that had actually worn through at the point encircled (Figure 2). Ordinarily a front so badly worn would be considered eligible for the scrap heap. But not at Big Rock. Amsco round filler bars were tacked on and the space under and between them filled in with V-Mang moly-manganese steel welding rod. While not restored to its original dimensions, the front is nevertheless sturdy and good for many months of service after which it can be built up again.

The original weight of this dipper front was approximately 5,500 pounds and about 550 pounds of filler bars and welding rod was required to place it in a serviceable condition, thus saving approximately 4,950 pounds of casting metal for war needs.

Figure 3

Figure 4

Figure 5

Several reversible gyratory crusher concaves which have been saved from the junk pile are shown in Figure 3. Mr. Tracy estimates that about 80 per cent. of the original casting weight still remains when the concaves are removed from service. The worn-away portion is replaced by using round filler bars from ⅜ inch to 1½ inch in diameter as necessary to obtain the right contour. Big Rock uses ½, ¾ and 1-inch

diameters for its work mainly. Skillfully welded to the worn concaves with V-Mang welding rod, a segment as good as new is provided. Excellent performance is reported from the concaves restored in this manner.

A crusher mantle that has been built up with filler bars and welding rod is shown in the right foreground of Figure 4. Mr. Tracy is of the opinion that this application is not particularly economical, but that it is helpful to our war effort.

Another interesting and unusual application of welding for the preservation of metal parts is the method used at Big Rock to increase the service life of the conveyor buckets used to carry rock from the quarry to the crushers.

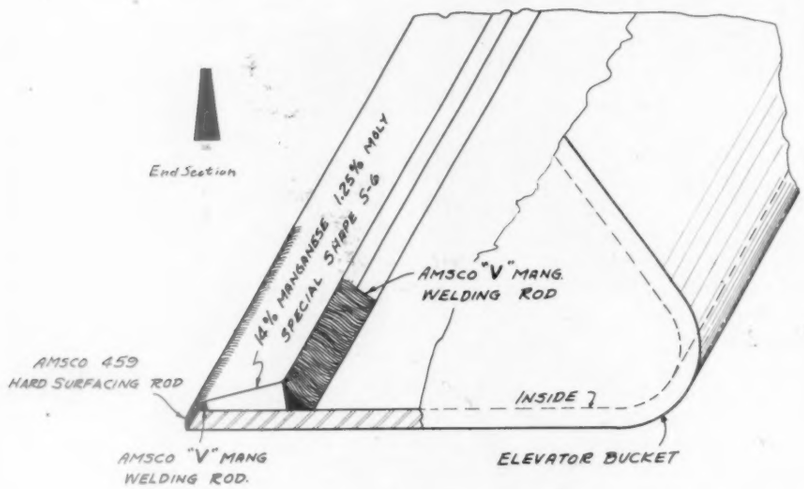


Figure 6.

The interior and exterior of several buckets are shown in Figure 5. Note the reinforcing strip on the lip in the interior view indicated by arrows. This was accomplished by welding to the carbon-steel lip a filler bar of molybdenum-manganese steel, the dimensions of which are: top ⅛ inch, bottom ⅜ inch, height 1 inch. V-Mang was used to weld on the No. 6 Amsco fillers, after which they were hard-faced with Amsco No. 459. The steps employed are detailed in the sketch (Figure 6).

When questioned as to the possibility of the thin edge of the lip wearing faster than the thicker portion, Mr. Tracy stated that the application of hard-surfacing rod protects the edge of the lip against fast wear with the result that the thicker portion wears slightly faster. The ultimate result is that the lip edge and base wear out at about the same time and the bucket lips are then renewed in the manner described.

Although considerable weld metal and filler material are used, building up worn buckets has proved a profitable undertaking and in addition it eases the demand for sheet steel.

Magnesia (*From page 48*)

rials since 1939, hitherto barely tapped sources of supply and little used methods of extraction are easily keeping pace with the demand. The raw materials being called upon to supply these needs—sea water, salt, dolomite, and limestone—are widespread in their occurrence and easily available in amounts beyond possible demand. Though our known magnesite resources are now larger than ever before, neither the refractory industry nor the magnesium-metal industry is dependent on magnesite and magnesium-chloride deposits any longer.

The contributions of the various sources to the WPB program of 200,000 tons of metal annually will be:

Source	Quantity (tons)	Percentage
Magnesite	89,000	45.5
Brines	10,500	5.3
Sea Water	54,000	27.0
Dolomite	46,500	23.2
	200,000	100.0

The trend of developments is such that when the expanded WPB goal of the order of 360,000 tons of metal is achieved, the share of dolomite will be considerably greater. Sea water and brines will probably also contribute a larger share.

The present rate of magnesium-metal production in the United States is considerably greater than the world production was in 1938, and the goal is expected to be attained in 1943.

Explosives Under Strict War Control

Quarry operators, in common with other uses of explosives, come within the purview of the wartime law administered by the Bureau of Mines forbidding the manufacture, distribution, storing, use, or possession of nonmilitary explosives or their ingredients except under special license.

Subsequent to the declaration of war in December, 1941, the law became operative and emergency permits were allowed so that no hardship would be entailed by legitimate users and makers of explosives. The expiration date of the temporary permits was set as March 1, 1942, but later was extended to March 16 for the United States proper and April 1 for territorial and island possessions.

The plan calls for at least one licensing agent (usually the county clerk or some other local officer authorized to administer oaths) in each of the 3,070 counties in our country to cooperate with the Bureau of Mines Explosives-Control Division to take care of one type of application and the headquarters at Washington to authorize the licenses for the second type.

The first type refers to foremen, purchasers, and vendors (wholesalers, retailers, and jobbers). The license is designed particularly for quarries and other industries in which explosives are used regularly. Under a foreman's license a supervisor foreman, or other authorized employee may issue explosives to men working under him for use on the job. Moreover, the regulations state: "Each employee charged with the custody or distribution of explosives must possess a foreman's license. No unlicensed employee shall issue or distribute explosives. No license is required for employees who purchase or receive from the foremen explosives for use in the mine or on the operating premises for the conduct of their work."

The second type of license applies solely to manufacturers, analysts, educators, and investigators. Although the application form may also be obtained from the Federal licensing agents in the cities and counties, when filled out it must be submitted to Washington for review by the Director of the Bureau of Mines, who is the only person autorized to grant such licenses.

This is a war measure, and the full cooperation and utmost caution of the legal users, stores, distributors, and makers is being sought.

Develops Special Blasting Technique to Produce Well-Shattered Granite

A SPECIAL technique has been under development at the Camak, Georgia, and Cayce, South Carolina, granite quarries of the Weston & Brooker Company with the object of producing well-shattered granite for the crusher plants with the least secondary blasting. Although the two quarries are not at all similar, the technique is basically the same in each, with variations to allow for differences in the height of the face, the character of the rock, the presence of cableways, etc.

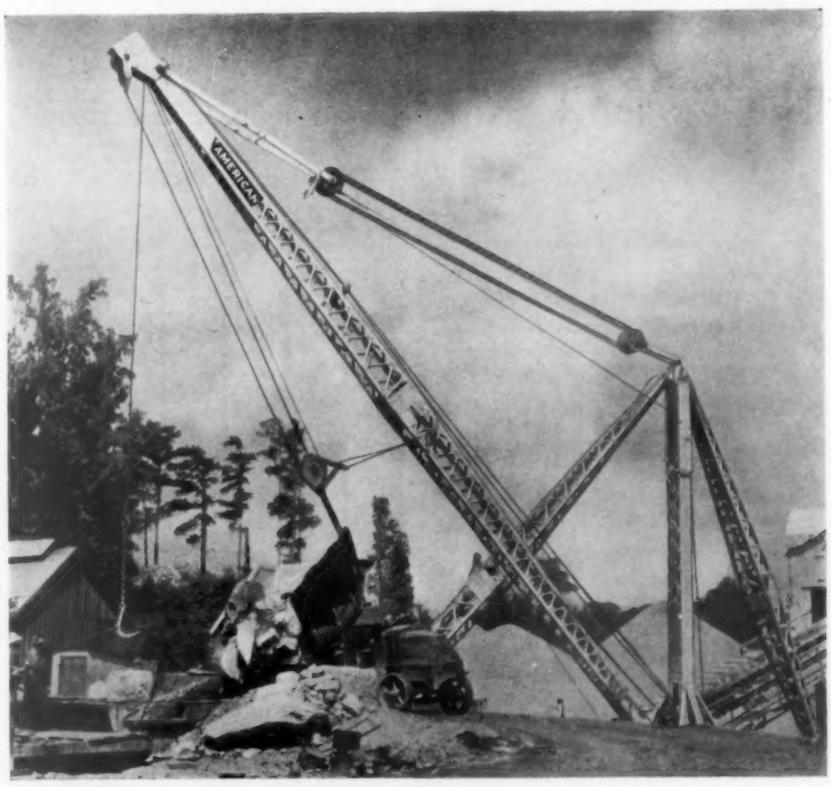
In general, the drilling and blasting are based on the principle of using heavy charges in deep well-drill holes, and somewhat lighter charges in shallower intermediate holes.

Camak quarry, opened in 1929, is an 80-acre shovel-and-truck operation with faces varying in height from 50 to 100 feet. Cayce quarry, on the outskirts of Columbia, South Carolina, was opened many years ago, has a 14-acre floor, is a shovel-and-cableway operation, and is from 175 to 200 feet deep.

At Camak 6-inch blast holes are made in micaceous granite with a No. 3 Keystone, a No. 51 Keystone and a No. 44 Loomis Clipper well-drills to depths of from 7 to 10 feet below the level of the quarry floor. This unusual extension below the floor level is made to avoid the need of bailing out the sand from the bottoms of the holes. The spacing of the well-drill blast holes is 17 feet back from the quarry face and 32 feet apart. About 10 feet of hole is made by the well-drill bits before resharpening is needed, and the average drilling speed is 3 feet per hour. Well-drill bits are sharpened by hand adjacent to the drilling operation.

Wagon-drill blast holes at Camak are 2½ to 1¼ inches in diameter and are sunk with an Ingersoll-Rand wagon-drill on which an Ingersoll-Rand X-71 drifter is mounted. These wagon-drill holes are usually about 30 feet deep, or ½ to 1/3 the depth of the well-drill holes, depending on the height of the stemming of the former. The wagon-drill holes are arranged in two rows: the front row is 8½ feet back from the quarry face with the holes 16 feet part; the rear row is 17 feet back from the quarry face, in line with the 6-inch well-drill holes. Wagon-drill holes are 32 feet apart, or one-half way between two well-drill holes. About 10 feet of wagon-drill hole is made at an average speed of 25 to 30 feet per hour before resharpening of the bit

A Cayce quarry view with some of the cableways visible. Shots are planned to avoid the hurling of rock upward which might damage the cables.



Derrick-and-hook arrangement used at the Camak quarry to dump stone into primary crusher.

By J. B. RENWICK

Stock-piling jetty stone at the top of the Cayce quarry face.

Well-drill in service at the Camak quarry.

is needed. Wagon-drill steel is sharpened in the blacksmith shop on the premises with an Ingersoll-Rand S-50 sharpener. All the small blast holes are drilled dry. Snakeholing is required only on those rare occasions when there is a toe to be blown out.

Air power at 100 pounds pressure for the wagon-drill and the 25 or more S-49, JA-55 and J-5 Ingersoll-Rand jack-hammers is supplied by one 1,000-c.f.m WJ-3 Sullivan compressor, belt-driven from an electric motor, and one PRE Ingersoll-Rand direct - connected compressor of 1,350-c.f.m. capacity.

Six-inch blast holes are loaded at the Camak quarry with at least 400 pounds of 5¼- by 25-inch sticks of 60-per cent. gelatin, with the bottom of the charge two or three feet below the level of the quarry floor. The general practice is to fill a well-drill hole with 60-per cent. gelatin from 2 to 3 feet below the level of the quarry floor to within from 18 to 20 feet of the top, Primacord being threaded through the bottom cartridge. Above the top of the charge comes 10 feet of rock-sand stemming, followed by one stick of 5¼- by 24-inch, 42-per cent. gelatin, after which the 6-inch hole is stemmed to the surface.

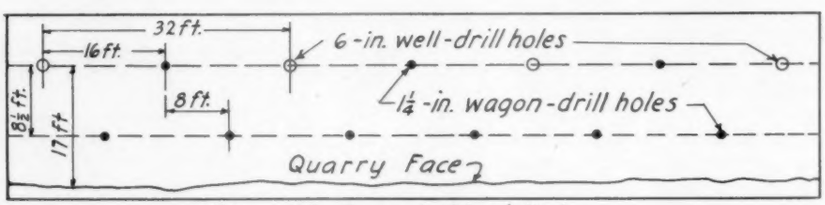
Wagon-drill blast holes at Camak are loaded with 1¼- by 8-inch sticks of 50-per cent. gelatin from the bottom to within 8 feet of the surface, and are then stemmed with rock sand to the surface. Primacord is also threaded through the bottom cartridge in these small holes.

From 4 to 13 six-inch well-drill blast holes and from 9 to 36 wagon-drill blast holes are fired at one time. The hook-up is in parallel or series, depending on whether many or few holes are to be shot in one blast. No. 6 blasting caps are used and the current is taken from a 110-volt power line, with a competent electrician at the master switch, after R. A. Hemphill, the superintendent of the Camak operation, has inspected the complete hook-up and given the firing signal.

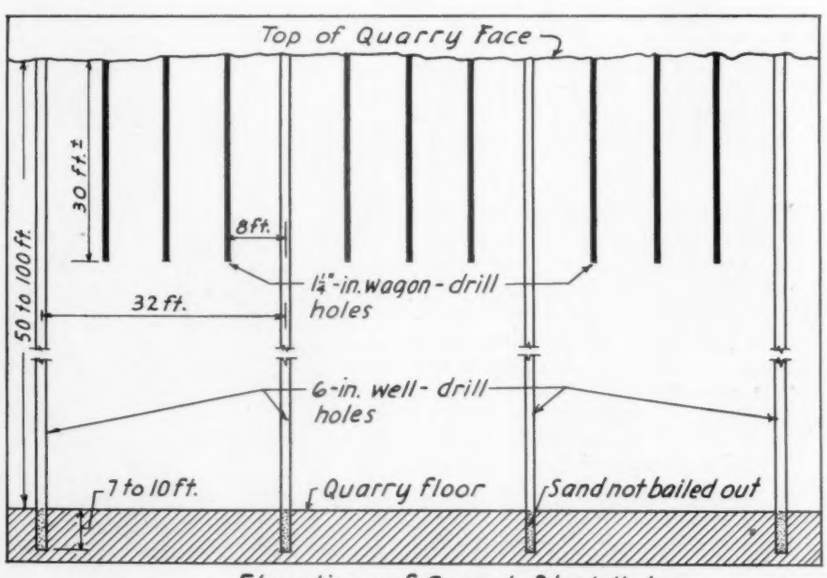
About 4½ tons of tock, weighing approximately 4,500 pounds per cubic yard in the solid and 3,150 pounds per cubic yard in the loose, is brought down for each pound of explosive used in primary blasting at the Camak quarry. The explosives are stored in a chamber blasted out of the rock, located outside the scope of normal operations.

Although the present technique has resulted in a material reduction in the amount of secondary blasting, there is still much to be done before the material is dumped into the 48- by 60-inch Allis-Chalmers McCully primary jaw crusher at the Camak plant. Not all the material brought down goes to the crusher, for the shovels at Camak load stones suitable for jetty work on trucks which haul them across the quarry floor to a point beneath a jetty-stone derrick for loading on railroad cars "spotted" on a siding on the quarry floor. When more jetty stone is needed than is normally recovered from a normal blast for crusher purposes, the quarry face beneath the derrick is blown down, but this is done only when jetty-stone requirements are 3 to 4 carloads per day.

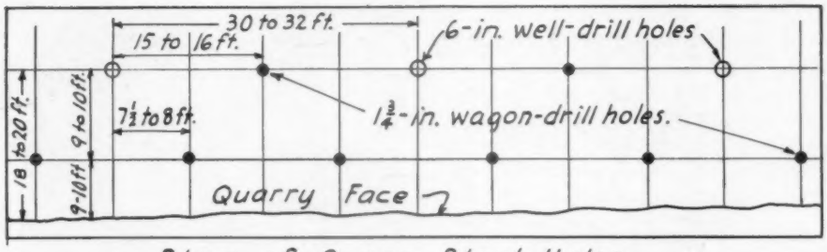
Big rocks, both for some of the jetty stones and for the primary crusher, are drilled with jack-hammers and shot with 1- by 8-inch sticks of 30-per cent. gelatin, touched off with No. 6 caps and 3 feet of Charter Oak fuse. No mud-capping is used. Where more accurate sizing of jetty stones is needed, the blocks are sometimes line-drilled and split with feathers and wedges, as in dimension-stone quarries.



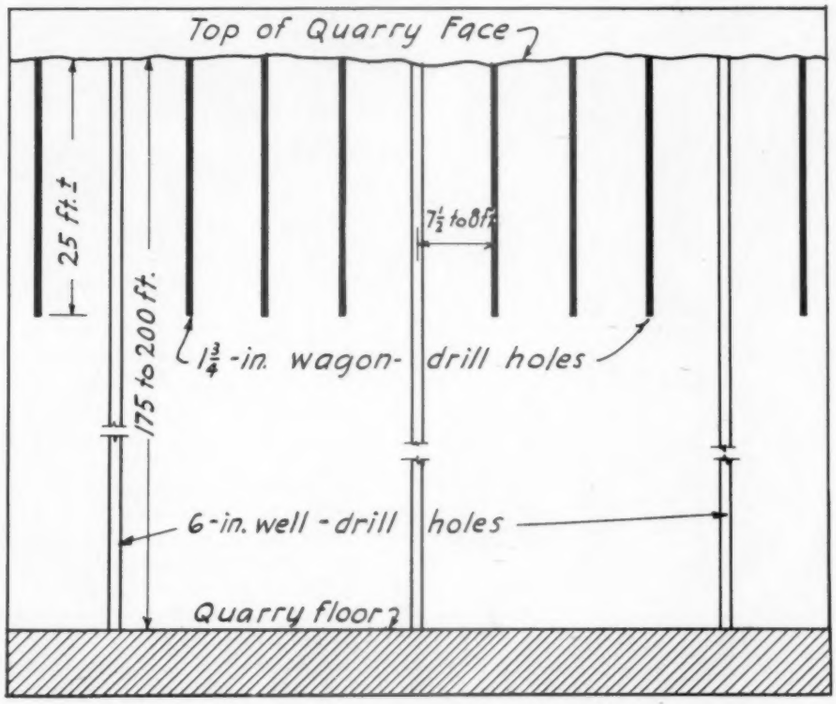
Plan of Camak Blast Holes



Elevation of Camak Blast Holes



Plan of Cayce Blast Holes



Elevation of Cayce Blast Holes

Although the face of the Cayce quarry is two or three times as high as that of the Camak quarry, and the pink granite at Cayce is exceptionally hard, tough and seamy, the same general technique is followed at Cayce as at Camak. The chief differences in the applications are slight changes in the blast-hole spacing and depths, and the use of larger quantities of more powerful explosives.

In the Camak quarry, jetty stone is loaded directly into cars on the quarry floor with the aid of this timber derrick.

The well-drills at the Cayce quarry are a No. 3½ Keystone with wood frame and steel wheels, which uses hemp line, and a No. 51 Keystone with steel frame and crawler treads, which uses wire rope. Both drill 6-inch holes at the rate of about 1 foot per hour, and require drill resharpening after about 4 feet of hole drilling. This resharpening is done in the blacksmith shop on the premises with an Armstrong bit sharpener.

The well-drill holes are spaced 20 feet back from the face of the quarry and 30 to 32 feet apart, in a single row; farther back from the face than at Camak, but closer together. The depth of the well-drill holes at Cayce is, of course, much greater than at Camak, being 175 to 200 feet. Furthermore, these 6-inch holes, because they are so expensive to drill, extend down only a little below the level of the quarry floor; hence they are bailed out clean to the bottom.

Wagon-drill holes at the Cayce quarry are made with two Ingersoll-Rand wagon-drills, on which X-71 Ingersoll-Rand drifters are mounted. In addition, an Ingersoll-Rand S-70 tripod drill is sometimes used to help out. These holes are 25 feet deep, instead of 30 feet as at Camak. The arrangement is also slightly different, being in two rows, but with one row 9 to 10 feet back from the quarry face, with the holes 15 to 16 feet apart, and the rear row 18 to 20 feet back from the quarry face, in line with the 6-inch blast holes, with a wagon-dill blast hole centered between two well-drill holes.

About 5 feet of wagon-drill hole is made at Cayce at the average rate of 15 feet per hour before resharpening of the bit is needed. The holes start at 2½ inches and end at 1¾ inches. The bits are resharpened on an Ingersoll-Rand S-50 sharpener in the blacksmith shop on the premises. All the holes are drilled wet. Snake-holing is seldom required, as it is

Skip-load of stone being dumped into primary crusher at the Cayce quarry.

Electric shovel loading a 7½-ton truck at the Cayce quarry.

used only for blowing out toes, which are rare.

Air at 100-p.s.i. pressure is provided by a belt-driven Ingersoll-Rand 750-c.f.m. and a direct-connected Worthington 1,250 - c.f.m. compressor, both powered by electric motors. These compressors also provide the air for operating a battery of Ingersoll-Rand jackhammers.

Well-drill blast holes at the Cayce quarry are loaded after consultation with the engineers of the manufacturers of the various brands of explosives used. Usually these 6-inch hoes are loaded with 5¼- by 24-inch cartridges of 75-per cent. gelatin at the bottom, Primacord being threaded through the bottom cartridge. Above the 75-per cent. gelatin comes a charge of 60-per cent. gelatin. On some holes a powder charge is loaded in above the 60-per cent. gelatin. The relative proportions of 75- and 60-per cent. gelatin, as well as the size of the powder charge, are determined largely by the depth of the hole and the seaminess of the rock. A fair average of the weight of explosive used per 6-inch hole would be about 1,500 pounds, of which about 400 pounds would be 75-per cent. gelatin and 1,100 pounds 60-per cent. gelatin —or sometimes 900 pounds of 60-per cent. gelatin and 200 pounds of powder instead of 1,100 pounds of 60-per cent. gelatin. The charge usually extends to within about 20 feet of the surface, followed by 10 feet of rock-sand stemming, then 1 or 2 sticks of 5¼- by 24-inch 50-per cent gelatin, with rock-sand stemming above this to the surface.

The wagon-drill blast holes at the Cayce quarry are occasionally but not frequently sprung with 50-per cent. gelatin to pocket the bottoms enough to take an adequate charge of explosive. For actual blasting these holes are loaded with either 50-per cent. or 60-per cent. gelatin, and sometimes both, in 1¼- by 8-inch sticks, with Primacord threaded through the first stick. A charge of 30 to 35 sticks of 50- or 60-per cent., 1¼- by 8-inch gelatin in the bottom 17 feet of 1¾-inch wagon-drill holes is not unusual. The 8 feet of hole above charge is stemmed with rock-sand.

Electric shovel loading a skip in the Cayce quarry.

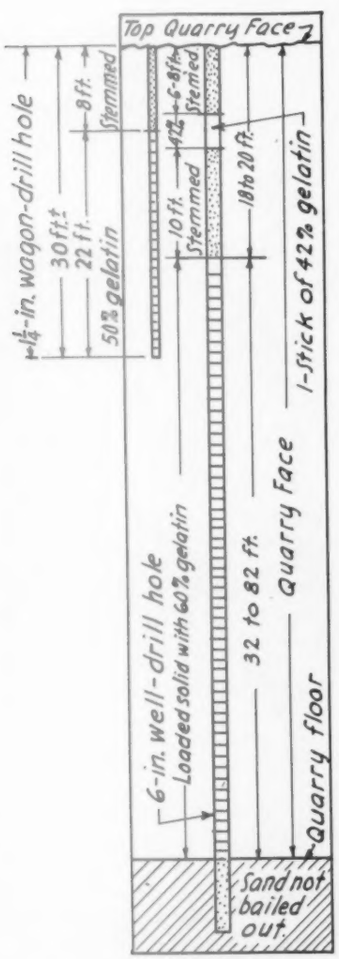
From 1 to 3 well-drill holes and from 3 or 4 to 6 wagon-drill holes are fired at one time at Cayce. The firing hook-up is always in series. No. 6 blasting caps and a blasting battery are used for detonation.

About 4½ tons of rock—harder and tougher than the granite quarried at Camak—is brought down for each pound of explosive used at the Cayce quarry—the same powder factor as at Camak.

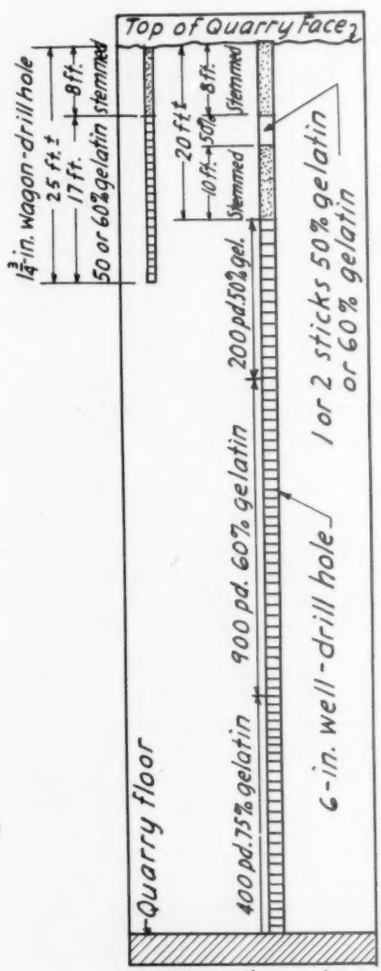
One of the reasons for the variability of loading at Cayce, aside from the depth of the holes and the character of the rock, is the need for guarding against any damage to the two cableways. In Cayce blasting, the rock must go *out,* not up.

Secondary drilling and blasting practices at Cayce are quite similar to those at Camak, although the primary crusher at Cayce is a 27-inch Kennedy-Van Saun gyratory. At Cayce stones suitable for jetty work are hoisted out of the hole with an American Hoist & Derrick rig and loaded on railroad cars at grade level 175 to 200 feet above the quarry floor.

W. S. Weston is president of the Weston & Brooker Company and W. B. Jamison is vice-president. W. L. Blackwell is general manager of all operations. Richard Simons is sales manager. R. A. Hemphill is superintendent at Camak; A. K. Rucker is superintendent at Cayce, with W. S. Weston, Jr., assistant superintendent. L. J. Burriss is chief engineer of both operations.



Hole Loading at Camak



Hole Loading at Cayce
Loading varies with each blast --- is seldom twice the same.

ASTM Devotes Discussions to Concrete and Its Ingredients

By GABRIEL A. ASH

THE proceedings at the Cementitious Materials sessions of the 45th annual convention of the American Society for Testing Materials, held at Atlantic City, June 22 to 26, were opened with the report of Committee C-1 presented by the chairman, P. H. Bates. The committee proposed revisions of the Tentative Methods of the Chemical Analysis of Portland cement. The new recommendations concern a rapid method of determining the sodium and potasium oxides. The new procedure is chiefly a modification of the method described by Francis W. Glaze of the National Bureau of Standards and is based on the use of zinc uranyl acetate reagent to precipitate sodium.

The committee also presented a tentative method for determining the sulphur occurring as sulphide in Portland cement. This method is based on work done by Harry A. Bright. A very interesting method for determination of the sulphuric anhydride in Portland cement by means of Wagner's turbidimeter has been considered by the committee for an appropriate recommendation at an early date.

On the problem of alkalies in cement, which became so acute in discussions at the convention of 1941, no definite conclusions were apparently reached, because no recommendations as to the limits of Na_2O and K_2O in Portland cement have been advanced.

An interesting recommendation has been submitted with respect to additions. The committee approved the addition of Vinsol in proportions of .025 to .045 per cent., to Portland cement, employed in highway concrete subjected to severe frost action. The present trend in the cement industry toward the use of additions found a reflection in the work of a special subcommittee (H. J. Gilkey, chairman), which is continuing its studies of additions, "particularly including some of the nonproprietary nature."

The present emergency created the problem of conserving critical materials through the revision of government and industrial specifications. The War Production Board organized the Specification Branch of the Bureau of Industrial Conservation. It is evident that this work on specifications will affect, or has already affected, the cement industry. Thus, according to P. H. Bates' statement, the WPB may reduce the number of cement types produced from 5 to 3, these three being the standard, the modified (moderate-heat) and high-early-strength cements. In addition, in order to economize the consumption of steel for grinding purposes, the fineness of Portland cement will be limited, so that its specific surface shall not exceed 2,000 square centimeters per gram. In order to facilitate the grinding, the use of TDA, a dispersing and catalytic agent, as an admixture to the clinker is permitted.

Alfred H. White and Harold S. Kemp presented their studies on long-time volume changes of Portland cement bars. The results observed for periods ranging from 17 to 41 years were reported. It is interesting to notice that the autoclave test detects in bars of neat cement the presence of free magnesia, which has not become hydrated even after immersion in water for 40 years.

A lively discussion followed Dr. Paul S. Roller's report on *Theory and Measurement of Plasticity and Workability of Mortars.* The author interprets plasticity on the basis of a simple stress-strain relationship. He applies the definition of plastic flow as the irreversible deformation of a metal under stress to such dispersion as cement mortar, used among physicists and metallurgists. Being aware of the complex character of workability, he considers the coefficient of plasticity of a mortar as a good approximation of its workability. Dr. Roller's somewhat "streamlined" conception of plastic flow met rather sharp criticism by Dr. F. O. Anderegg. From the practical point of view it is interesting that Dr. Roller's tests showed that the addition of mineral powders produced greater water retention than that of organic admixtures, plasticity being the same. In Dr. Roller's opinion, the organic admixtures cause an increase in attraction between the dispersed particles, contrary to the often-expressed view that the effect of organic admixtures consists in "air-whipping" into the mortar during the mixing.

Prof. Howard R. Stanley reported on the effect of curing masonry mortars. Dr. F. O. Anderegg presented his paper on the effect of brick-absorption characteristics upon mortar properties.

The report of Committee C-7 on lime did not comprise any new suggestions. It recommended that the Tentative Specification for Hydraulic Hydrated Lime (C 141-38T) be approved as standard.

The report of Committee C-11 on Gypsum contains the recommendation of a tentative revision in Section 8 of Standard Specification C-72-40 and also in Section 16(b) of the Standard Method of Testing Gypsum and Gypsum Products (C-26-40).

At the session on Building Materials, Concrete and Concrete Aggregates, in addition to the reports of various committees, six papers were presented. Two of them were appended to the reports of the Committee C-15 and C-16. The first, by John W. McBurney of the National Bureau of Standards, described the relations between the results of laboratory freezing and thawing and the physical properties of certain soft-mud bricks. The second paper about *Conductivity Determination by the Guarded Hot-Plate Method* comprised a report on behalf of the Joint Committee on Thermal Conductivity of the A.S.H.V.E., A.S.T.M., A.S.R.E., and the National Research Council prepared by F. C. Houghten, American Society of Heating and Ventilating Engineers.

The other four papers were as follows:

The paper by James W. Johnson of the Iowa State Highway Commission dealt with the effect of the height of test specimens on the compressive strength of the concrete. The investigator admitted that the limited scope of the investigations prevented the formation of definite conclusions. However, the results obtained indicate that the standard correction factors are reliable for all values of h/d except 1.00 and those in excess of 2.00. They also showed some indications that the loss of compressive strength of tall cast specimens made from concrete of wetter consistencies may be due to water gain.

A paper on *The Influence of the Durability of Aggregates upon the Durability of the Resulting Concrete* was presented by H. H. Munger of the Kansas State College of Agriculture and Applied Science, Manhattan, Kansas. The purpose of this investigation was to determine the ex-

tent to which the results of the soundness test of aggregates by the freezing-and-thawing method, may be relied upon as a criterion of the durability of the resulting concrete. The investigator came to the conclusion that for the materials used there was not established any dependable correlation between the results of the soundness tests upon aggregates *per se* and the durability of concrete. Moreover, the investigator states that "compressive strength is not a reliable index of deterioration in concretes of the type used" in his investigation.

Another paper presented an interesting study on the reflectivity of white Portland cement executed by C. W. Muhlenbruch and E. H. Miller of the Carnegie Institute of Technology, Pittsburgh. Standard white Portland cement and white waterproof-type cement were studied. Allegheny River sand and commercial white sand from silica rock deposit were used as fine aggregates. Various kinds of admixtures, such as dispersing agents, wetting agents, etc., were used. The reflectivity, compared to that of a sand-blasted white-glass standard plate, reached a maximum of 82 per cent. in 15 days. The aggregates, naturally, decrease the reflectivity; river sand far more than the white sand. An increase of the water-cement ratio improves the reflectivity. Atmospheric exposure considerably reduces the reflectivity; the same has to be said of the effect of severe cycles of freezing and thawing.

Professor Roy W. Carson of the Massachusetts Institute of Technology, Cambridge, Massachusetts, presented his studies on the addition of minute amounts of aluminum to concrete. The proportions of aluminum powder varied from .003 up to .056 per cent. The purpose was to produce a little internal expansion of the cement paste during hardening and to remove the usual "water gain" under aggregate particles and reinforced bars. The addition of very small amounts of aluminum powder resulted in improving the bond to reinforcing steel. The comprehensive strength showed a decrease; the flexion, however, an increase. It is interesting to note that the addition of very small amounts of aluminum powder (.007 per cent.) increases the compressive strength of harsh and lean mixes. This effect may be due to diminishing segregation in the mixture. When the amount of aluminum powder is such as to reduce the weight of the concrete 7 per cent., greatly increased resistance to freezing and thawing with calcium chloride has been established without serious decrease in strength.

Various committees presented their reports, but they did not contain any recommendations as to substantial changes in the existing specifications or testing methods. The only exception was the report of Committee C-9, which recommended a revision in the Standard Specification for Concrete Aggregates (C33-40) as a tentative one, changing the maximum permissible limit on material finer than a No. 200 sieve for aggregates used in concrete subjected to surface abrasion. The limit of 3 per cent. is increased to 4 per cent. Further, the new limitations (section 4) for the fine aggregates shall be:

Percentage passing sieve No. 50 (297-micron): 10 to 30

Percentage passing sieve No. 100 (149-micron): 2 to 10

instead of the previous 5 to 30 and 0 to 8, respectively. Other recommendations are partly of an editorial nature (C94-41T), or of minor importance. Before starting the report, the chairman of Committee C-9, F. H. Jackson, announced that the Sanford E. Thompson Award for a paper of outstanding merit on concrete will be made to John Tucker, Jr., for his paper on *Statistical Theory of the Effect of Dimensions and of Method of Loading Upon the Modulus of Rupture of Beams.* This paper was presented at the 1941 annual meeting of the Society.

A short speech was devoted to the memory of late Professor Arthur Newell Talbot, honorary chairman of Committee C-9, who exercised a far-reaching influence on the engineering developments of this country and who died on April 3, at the age of 84.

Granted Authority for Fluorspar Price Rise

The Navajo Fluorspar Mines, of Grants, New Mexico, has been granted authority by the Office of Price Administration to sell fluorspar crude ore having a 70 per cent. CaF_2 content on a dry basis at a maximum price of $10 per net ton, f. o. b. Grants.

Maximum prices could not be established for the company's production of this grade of fluorspar ore under § 1376.1 (a) (1) and (2) of Maximum Price Regulation No. 126 (Fluorspar) as neither the company nor any other producer in its area previously shipped crude fluorspar ore to eastern processing mills. Accordingly, Mr. Henderson stated, the maximum price was determined under the provision of the regulation which provides for determination of a ceiling price upon the application of the producer.

The price of $10 per ton, f. o. b. mine for this grade of ore is in line with the level of maximum prices established in Maximum Price Regulation No. 126, he said.

Sets $15 Ceiling on Roofing Granules

The Minnesota Mining & Manufacturing Company of St. Paul has been granted permission to sell a certain type of green roofing granules at a maximum price of $15 per ton, Price Administrator Leon Henderson announced June 30.

These granules are of a type different from any the company or its nearest competitor sold in March, 1942; consequently, the company applied for authorization of a maximum price under the provisions of Section 3 (b) of the General Maximum Price Regulation. Approval of a price of $15 per ton was contained in Order No. 16, effective July 3, 1942.

The new granules will take the place of a type which can no longer be manufactured because vital war materials were used in its production. The mark-up over the average cost of producing the new granules is less, both by amount and percentage, than that for the type it replaces.

Camouflage Methods for Industrial Buildings

Camouflage methods for industrial plants, etc., are described in a profusely illustrated 68-page booklet entitled *Protective Concealment,* issued by the Office of Civilian Defense.

The booklet was prepared by the War Department under the direction of the Chief of Engineers, U. S. Army, by the Engineer Board, with suggestions of the National Technological Civil Protection Committee.

The booklet declares that, although its contents were compiled after a careful view of European and American records, it must be borne in mind that any of its suggestions must be considered to be of no more than temporary value. It emphasizes the fact that any use of camouflage should be carefully considered and planned and only with the technical assistance of trained personnel.

Lime Association's Research Program Broadens Demand for Makers' Product

THE twenty-fourth annual convention of the National Lime Association, which was also the fortieth annual meeting of the lime-manufacturing industry, attracted a representative group of producers to the Homestead at Hot Springs, Virginia, May 26 to 28. Like many of its predecessors, the convention program covered the broad range of lime uses, dealt with some of the technical problems of production, and included discussions of business difficulties presented by the priorities regulations of WPB and the General Maximum Price Regulation.

President Walter S. Stauffer, in his opening address, spoke of some of the changes that have occurred in the lime industry in the last thirty-five or forty years. In 1906, he said, 81 per cent. of the industry's product reckoned by dollar value went into building construction and only 8 per cent. into the chemical and processing industries. Last year, by contrast, 31 per cent. went into building and 60 per cent. into the chemical and processing industries. At present, it has been estimated, only 10 to 15 per cent. finds its way into building construction, while from 75 to 80 per cent. of the industry's product is chemical lime. This striking change in the nature of the industry's markets he attributed in part to the remarkable growth of the chemical industries, but the inroads made on those markets by competitive products can not be ignored as important contributing factors.

The speaker referred to the organization of the Hydrated Lime Bureau in 1914 and to the effects of its promotion of hydrated lime for mortar, plaster and concrete. He showed a photograph of the dam over the White Salmon River in Washington, in the concrete of which 10 per cent. of hydrated lime was used. In the Leader-News Building in Cleveland, built before 1914, hydrated lime was used in all the concrete and brick mortar. In the reservoir at Waltham, Massachusetts, 5 per cent. of hydrated lime was used in the concrete.

The bureau was consolidated with the National Lime Manufacturers in 1918, when a very active program of association work was begun. For eight years, according to Mr. Stauffer, the lime industry was very active. A laboratory was established and research activities were carried on; intensive promotional work was done; branch offices were set up in different sections of the country. By the end of the first decade of its existence that organization had disintegrated, but a spirit of revival set in, the group was reorganized as the National Lime Assosiation, and the modern period began. Following the collapse of the NRA another disintegration set in, but again the determination of the lime industry to do something constructive for itself asserted itself.

These ups and downs in the industry's association history are to be attributed largely to the lack of adequate research, in Mr. Stauffer's opinion. He said too much reliance was placed on incomplete data, wishful thinking, high-pressure propaganda. In spite of the fact that the desirable properties of lime as ingredients in mortar and concrete had been known for years, until a few years ago there were no standards of measurement of these qualities and there are still a number of them for which no tests have been devised.

The speaker contrasted this situation with that of cement. The latter, he said, is sold on a single property, strength, whereas the lime manufacturer talks of his product's workability, of its ability to make concrete and mortar more nearly water-tight. The cement industry, he said, has definite measurements of all forms of strength and implied that there are no similarly dependable methods for measuring workability and water-tightness.

He spoke appreciately of the work done by Walter C. Voss, professor of building construction at the Massachusetts Institute of Technology, and his assistant, Howard R. Staley, in the field of construction materials. He referred similarly to the work of Charles P. Hoover, chemist in charge of the water-softening and filtration plant at Columbus, Ohio, in the field of public health and sanitation. He spoke also of the studies of lime made at the University of Illinois under the direction of Dr. G. L. Clark by means of the electron microscope. The association has now undertaken to bear part of the expense of a study of lime and its application to the various uses found in the chemical industries being conducted by Arthur D. Little, Inc. in Boston.

In 1938, Mr. Stauffer, said, the association established a fellowship at Rutgers University, whose Dr. Rutgers prepared for it a book entitled *Principles of Sewage Treatment*. In 1940 a fellowship was established at the University of Illinois under Dr. Clark.

The speaker cited these facts as evidence of the growing appreciation on the part of the lime industry of the great value to it of consistent and well-directed research. He said that six years ago the association was spending $37,000 a year for salaries and $3,000 for research, whereas the present budget provides only $23,000 for salaries but approximately $25,000 for research.

A stereopticon-illustrated discussion of the *Efficient Use of Lime on the Dairy Farm* was provided by Dr. A. R. Midgley, research agronomist of the Vermont Agricultural Experiment Station at Burlington. He said that his state has about 1 cow per capita and supplies milk to consumers in the Boston and New York territories, because it is a natural grass country well suited to dairying. Better production of hay and pasture is the real problem. For this he advocates small, frequent and regular applications of lime rather than a single large application. Less leaching results, there is a greater reduction in soil acidity and proportionally greater crop growth. The application of the limestone to the soil is facilitated by applying it with manure. Caustic lime (hydrated lime) can be placed in a clean gutter and the manure does not ammonify. The urea in the gutter changes to ammonia and passes into the air. The use of lime allows this ammonification to take place and reduces the drying loss.

Limestone is seldom recommended for use in the gutter, according to Dr. Midgley, because of the extra labor involved. Superphosphate or caustic lime (hydrated lime) is better.

Limestone exerts its powers to the best advantage when spread on the field with the manure, but a good

type of lime-spreader for this purpose is badly needed. Two hundred pounds of lime to each load of manure is a good average proportion, or 100 to 200 pounds of lime on the top of the manure-spreader.

The use of limestone tends to reduce the nitrogen and phosphate run-off with phosphate manure during the period of snow melting and spring rains.

Dr. Firman E. Bear, soil chemist of the New Jersey Agricultural Experiment Station at New Brunswick, spoke on *Meeting the National Emergency with Lime.* He said there is a definite scarcity of fertilizer and labor and that, as lime makes fertilizer more effective, its use results in the production of more food from fewer acres, and thus helps in the winning of the war. The more lime used, the better the soil and the larger the crop. Grass, he said, grows in the top 2 or 3 inches of soil, while other crops need from 2 to 3 feet of soil.

He mentioned the soils of the Rio Grande valley in California as the most productive for they need nothing but water. In the northeastern and southeastern sections of the United States the soils are acid all the way down and need lime badly. Most of the soils west of the Mississippi River need little or no lime, while most soils east of it must be limed.

The rain washes the salts from the land into the ocean, which is so highly saline that if all the salt contained in it were evaporated it would cover the United States and Alaska to a depth of 1¼ miles. The salts which have been washed from the land must be restored to it to make it fertile.

In New Jersey, according to Dr. Bear, the average annual use of lime or its equivalent amounts to 177 pounds per acre.

Plowed soils and subsoils need liming, he said. The lime should be plowed into the bottoms of the furrows as well as being applied to their tops. A subsoiling device to drop lime into the bottoms of the furrows is available. Deep roots enable plants to survive until water comes, hence the importance of reaching the subsoil with lime and making possible the development of deep roots.

The speaker believes that a food shortage may develop if the war lasts long. Nitrogen is being used in the manufacture of ammunition, so nitrogen must be grown through leguminous plants. We must begin applying lime now and continue throughout the year and the winter.

Recent Developments in Water-Softening was the topic discussed by Charles P. Hoover, chemist in charge of the water-softening and filtration plant at Columbus, Ohio. By the use of laboratory equipment, the speaker said, he had emphasized three aspects of water-softening: (1) the cheapness of lime, (2) the fact that lime-softened water is not "doped" with chemicals, and (3) the economic aspects and advantages of softening. As to the first he said that lime is not only cheap in first cost but is twice as reactive as any other water-softening compound.

As to the second he said that when lime is added to hard water in the proper proportions it is precipitated or made insoluble and, in addition, precipitates the hardness compounds which may be removed by sedimentation or filtration. In the soda-ash treatment and zeolite process the hardness compounds are converted into sodium salts and are not removed from the water. This advantage of lime, coupled with its low cost, has given it preference over the zeolite process in many cases. Newly-discovered zeolites, which actually remove the hardness compounds from the water, threaten to destroy this advantage which lime had for so many years.

As to the third point Mr. Hoover said that the softening of water in a single central plant rather than in thousands of individual home or factory plants is economically sound, and that widespread water-softening is contributing to the war effort, because hard water destroys soap and has an undesirable effect on clothes washed in it, and on the plumbing and heating systems in which it is used. Both soap and plumbing and heating materials are scarce, so that anything which will lessen our need for them contributes to our winning the war.

With reference to soaps the speaker pointed out that our available stocks of cocoanut oil, which constitutes about 45 per cent. of the oil used by the soap industry, are rapidly being depleted and that within about 8 months substitutes for it will have to be used. The use of such substitutes, which lack some of the qualities of cocoanut oil, will result in the making of inferior soaps. The saving of soap which follows from the use of soft water becomes important because much of the material of which it is made is imported and difficult to get.

The speaker compared the amounts of various water-softening agents required to replace 20 pounds of soap in this way:

Softening Reagent	Pounds Required	Approx. Cost
Lime	1.0	$ .005
Soda Ash	1.9	.200
Salt	5.0	.225
Soap	20.0	3.000

Commenting on other water-softening processes, Mr. Hoover said that 164 municipal zeolite water-softening plants have been built since 1924, and more than a hundred of these within the last five years. There were almost as many zeolite as lime water-softening plants erected in the last half-decade.

The favor shown for the zeolite process is due to five reasons: (1) the initial plant investment is usually lower; (2) the operation of the plant is somewhat simpler; (3) there is no sludge to be disposed of; (4) the improvement in the quality and capacity of zeolites; and (5) the promotional work done by zeolite manufacturers and salt producers. Early American zeolites were slow-reacting and slow-regenerating. They were soon replaced by green sand (a natural product found in New Jersey) and by synthetic gel-type zeolite. Both these products are quick-reacting and can be regenerated quickly. The gel-type zeolite has about three times the softening capacity of green sand or of the early type of zeolite. New products are carbonaceous and resinous zeolites, which can be regenerated with sulphuric or hydrochloric acid, and with these products it is possible to demineralize the water completely. Even salt will be removed.

Developments in the use of soda-ash have been made, chiefly: (1) the use of excess lime and the addition of aluminum compounds to precipitate the magnesium compounds; (2) recarbonation or the addition of CO_2 gas to the softened water to neutralize the excess lime and partially to stabilize it; (3) the so-called sludge-blanket filtration; (4) continuous removal of the sludge from the settling basins; (5) improved chemical-feeding devices; (6) filter-surface washers; and (7) the application of calgon to lime-softened water to stabilize it.

Mr. Hoover showed pictures illustrating Spaulding precipitator in which the raw water, with the added chemicals, is mixed with a large amount of previously-formed sludge and must pass up through the sludge blanket. The mixing, flocculating and settling operations are accomplished in one basin. The coagula-

tion and the water-softening reactions are hastened due to the contact of the chemically-treated water with tremendous areas of sludge, and clarification is promoted because of the upward filtration of the coagulated water through the sludge blanket. This entire procedure is accomplished in some instances in less than an hour, as compared with

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softened water for boiler feed, and by others who have been troubled by the formation of calcium-carbonate scale on condensors and in cooling systems. About 400 municipal water supplies are being treated with this sodium-hexametaphosphate compound. Its use makes the lime-softened water more highly alkaline when it goes to the distributing mains and thus retards corrosion and red water and yet does not produce excessive scale.

The speaker enumerated several still-unsolved water-softening problems: (1) precise control of the softened water with regard to its corrosiveness; (2) the recovery or disposal of the precipitate of the lime-soda ash process; (3) control of the alkalinities by recarbonation; (4) the control of recarbonation to hasten the precipitation of $CaCO_3$, particularly to give relief to the building up of filter-sand particle size; (5) the control of the process to produce perfectly clear water without filtration; and (6) control of the lime softening to produce good coagulation in low-turbidity water without using a coagulant.

R. W. McAllister of Arthur D. Little, Inc., discussed *The Examination of Lime and Hydrate for Special Industrial Uses.* He reported on investigations of the settling characteristics of high-calcium hydrate suspensions and of various dolomitic hydrates, of surface area, abrasiveness and hydrate adhesion and showed the results of microscopic examination and of electrostatic charges.

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at the 1940 convention. He reviewed what had been accomplished in the use of this equipment in the study of lime burning and the distinguishing of soft-burned lime from hard-burned high-calcium quicklime by its diffraction pattern. He described in detail the construction of the equipment and the improvements made in it, such as the use of Bersyllium windows and extremely fine focus. He illustrated his remarks with slides showing the equipment and representative diffraction patterns.

For a discussion of priority ratings in their effects on the lime industry those in attendance were fortunate in having the comments of Dr. Wilbur A. Nelson, administrator of the Mining Branch of WPB, who spoke on *Priority Assistance Provided for the Lime Industry by the Mining Order P-56.* He explained in considerable detail the application of the order and the significance of the various ratings it provides.

The first rating provided by Preference Rating Order P-56 as amended on March 2 (see *P & Q*, April, 1942, pages 30 to 33) is A-1-a. This is granted by telegram to anyone who has suffered a plant breakdown which is causing a partial or complete shut-down of his operations. This rating can be extended by the producer's supplier on that same level so that he can replenish his stock. The Mining Branch is giving 24-hour service in such cases, and in many instances of that kind producers have obtained relief within that time.

The next rating in the P-56 order is the A-1-c for repair parts for one group of mines or for anticipated breakdown. The lime industry does not have an A-1-c quota basis on which to work (see the article cited above), but it has such a rating for anticipated breakdown. Wherever parts of equipment have a definitely known life that is fast coming to an end, or wherever its condition is such that the time of necessary replacement can be foreseen as likely to occur within a few weeks, the producer can write the Mining Branch for an A-1-c rating in order to get the necessary parts and the branch will attempt to get the rating to the producer's supplier in time to provide the part before the anticipated breakdown occurs.

There is an A-8 rating for supplies and articles which are not repairs to the machinery listed in Schedule A attached to the P-56 order (see the article cited above), said Dr. Nelson. He mentioned containers and referred to a statement sent to him on March 14 by Charles Daly of the Container Branch of WPB which said: "This is to advise that the Steel Drum Section of the Container Branch will honor the ratings under Preference Rating Order P-56 for obtaining steel drums for the mining industry." If such drums can not be obtained on an A-8 rating, the Mining Branch will, on application, give the rating necessary.

The A-10 rating, said the speaker, is new and was added to P-56 when it was amended March 2 (see the article cited above). It is for office supplies and other items which are not actually a part of the mining enterprise but are essential for carrying on work in the mining industries.

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Sodium hexametaphosphate will soften water without producing precipitates, but its cost is still too high for use in municipal plants, Mr. Hoover said. He then told of an interesting use of this chemical in connection with the supply of irrigation water in which nitrogen had already been dissolved. This ammonia-carrying water clogged the porous tiles of the citrus-fruit growers' water-distribution lines, a deposit one-sixteenth inch in thickness forming in 8 hours. One part of sodium hexametaphosphate per million of the solution was found to be enough to prevent the formation of the calcium-carbonate precipitate which plugged the lines. As a result, this chemical is being used by many railroads to prevent the incrustation of pipe-lines carrying lime-soda ash softened water for boiler feed, and by others who have been troubled by the formation of calcium-carbonate scale on condensors and in cooling systems. About 400 municipal water supplies are being treated with this sodium-hexametaphosphate compound. Its use makes the lime-softened water more highly alkaline when it goes to the distributing mains and thus retards corrosion and red water and yet does not produce excessive scale.

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He believes that a further knowledge of the factors which modify hydrate settling characteristics is especially valuable now. A fast-settling yet quickly-reactive hydrate would be valuable in the soda-lime process for caustic production and might resist the trend toward the increasing use of electrolytic caustic. The by-product calcium carbonate from such a hydrate should be good in paper coating. It should also prove valuable in water and sewage treatment. A slower-settling hydrate should be more satisfactory for leather treating.

He expressed the opinion that a hydrate made up of increments of a selected particle-size range might prove to be as valuable as cement when properly sized.

Dr. G. L. Clark, professor of chemistry, University of Illinois, continued his report on the use of the electron microscope in structural investigations of lime which he began at the 1940 convention. He reviewed what had been accomplished in the use of this equipment in the study of lime burning and the distinguishing of soft-burned lime from hard-burned high-calcium quicklime by its diffraction pattern. He described in detail the construction of the equipment and the improvements made in it, such as the use of Bersyllium windows and extremely fine focus. He illustrated his remarks with slides showing the equipment and representative diffraction patterns.

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desired machine is necessary for the total war effort, and that the plant where it is to be installed is the place where that machine can do the most good.

The speaker explained how Preference Rating Order P-56a, which governs the makers of equipment and is the mining-machinery-industry counterpart of P-56 covering the mining industry, enables the manufacturers working under it to get their advance material requirements on a quarterly basis on an A-1-a rating (*P & Q*, May, 1942, pages 41 to 42). Each maker of mining machinery fills in a form known as PD-25a, listing item by item his advance quarterly requirements for raw materials and fabricated articles. The Mining Branch, Dr. Nelson said, has taken all the articles listed on this form by each maker of mining machinery who is operating under P-25A and has totalled them. Based on these data, the branch was able to get from William Batt's Requirements Committee Determination No. 20, which states that the total needs of these makers of mining machinery for the second quarter of this year should be furnished them, as it is essential that the manufacture of mining machinery be continued. Subsequently J. S. Knowlson, who is in charge of Industry Operations in WPB, wrote Mr. Batt a letter, wherein he said that the raw-material requirements of the makers of mining machinery should be filled on an A-1-a rating, and that where there were any limitation orders, stating that only a certain percentage of an order should be filled, such limitation orders should not apply to any of the requirements of the makers of mining machinery. Thus, in the case of copper, for example, in the use of which everyone in recent months has been given only 60 or 80 per cent. of what he needed, the mining-machinery manufacturer will get 100 per cent. of his requirements.

Dr. Nelson pointed out the necessity of giving to mining-machinery manufacturers this priority status in order to enable them to keep the mining industries in operating condition. He said that the plants of many mining-machinery makers had been taken over in large part by the Army and Navy for the making of munitions, because of their having some of the finest precision tools in the country, and as a result many such plants had less than 50 per cent. of their capacity available for the making of mining machinery. Prior to March 2 such manufacturers were operating under three sets of ratings and orders: A-1-a for munitions, A-1-a for machine tools, and A-3 for materials for making mining machinery. The Mining Branch was able to get parity rating, A-1-a, for the mining-machinery industry, which now is getting the raw materials it needs to make at least a large proportion of the equipment needed by the mining industries. Because of this parity rating for the mining industries, the Mining Branch must exercise every caution to see that only justifiable claims for high ratings by mining enterprises are allowed.

On the subject of the effects on the mining industries of the changeover from priority ratings to allocations under the Production Requirements Plan (PRP) on July 1 Dr. Nelson was able to say that in a recent conference on this subject with those members of WPB responsible for the development of the new method of distributing materials to industry he was told that there would be no change in the way in which the Mining Branch would take care of the needs of the mining industries. If any of these orders are cancelled, he said, the provisions of the orders will still remain in effect and will be handled by the Mining Branch as they have been in the past.

Dr. Nelson said, with reference to the report form known as PD-119, that the Division of Research and Statistics of WPB had insisted that this form be changed and that the result is "entirely unsatisfactory to the Mining Branch." He asked his listeners nevertheless to fill in the revised form and mail it in the usual way until the branch can, as he hopes, get the industry back on the PD-119 form. In any event, one copy of the form is to be sent to the State Coördinator for Mines of the state in which a plant is located and another copy to one of the divisions of WPB in accordance with the instructions accompanying the new form.

In his discussion of *The General Maximum Price Regulation as It Applies to the Lime Industry* the association's counsel, Abram F. Myers, said that this was the first time in any country that government "has undertaken to put a 'ceiling' on prices without at the same time stabilizing the largest single item of cost of virtually all commodities—wages." It will be difficult, the speaker said, for a manufacturer to adhere to his March prices if he must later raise wages. The government was not unaware of this defect in the plan, he said, but was hopeful that labor can be induced to do voluntarily what industry is required to do by law.

Mr. Myers feels that industry should be somewhat reassured by the *Statement of Considerations Involved in the Issuance of the General Maximum Price Regulation* given out by Leon Henderson, administrator of OPA. This statement says:

"It is the immediate purpose of this regulation to guarantee to the American people that their living costs will remain stable. This is a prerequisite to the further measures which are necessary to insure wartime stability in the economy. Stable living costs mean stability in the real wages of the worker. With price stability, wage stabilization, an important step toward stabilization of the aggregate volume of purchasing power, becomes a practical goal of public policy. Every producer whose prices are stabilized is assured that his costs, which are based upon the stabilized prices of others, will not rise. Stability in the price level means that participants in war-savings programs are assured that the real value of their savings will be maintained. Likewise, the taxpayer knows that his remaining untaxed income will have an assured purchasing power. All these measures become possible when prices are stabilized. All of them are necessary in order that price stabilization may work."

Mr. Myers pointed out that the price regulation, by imposing a general price ceiling, had departed from the plan that was expected, namely a program of special orders applicable to particular industries. The present plan is simpler.

Lime is not included among the commodities designated by the Price Administrator as "cost-of-living commodities" and is not subject to the peculiar regulations applicable to commodities so designated, said the speaker. As lime manufacturers do not sell at wholesale or at retail, as those terms are defined in the regulation, they are not subject to the rules imposed on dealers. There is, therefore, no need to post "maximum" or "ceiling" prices where they can be seen by customers, and manufacturers are exempted from the provisions requiring registration and the granting of licenses.

No uniform price for any commodity is prescribed by the regulation, the speaker pointed out; the

"ceiling" price of any seller is the highest price for which he sold and delivered the commodity during the basic period. The seller who did not have any transactions in that commodity during March must adopt as his "ceiling" the highest price during March of "the similar commodity most nearly like it." And if he did not deal in the same or similar commodities during March, he must observe as his "ceiling" the highest price charged during that month by the "most closely competitive seller of the same class" for the same commodity, or, if no charge was made by such competitor for the same commodity, then the charge made by him for the "similar commodity most nearly like it."

To provide against "washed sales" the regulation requires that the highest price during March, in order to qualify as the maximum price for a seller, must have been charged "for a commodity d e l i v e r e d during March, 1942," or, if a seller made no delivery during that month, then the price must be his highest "offering price for delivery during that month." The word "delivered" is complied with if during March the commodity was received by the purchaser or by any carrier. A price charged for a commodity sold in March but not delivered until April or later would not qualify under this provision. Sellers using price lists are safe, but others may have to prove that their "ceiling" prices are those regularly quoted.

Mr. Myers explained that the regulation provides also that no seller may change his customary allowances, discounts, or other price differentials unless such change results in a lower price. Thus, the highest price charged during March, in order to serve as a "ceiling" price, must be a price charged "to a purchaser of the same class." "Purchaser of the same class," according to the definition in the regulation, "refers to the practice adopted by the seller in setting different prices for commodities for sales to different purchasers or kinds of purchasers (for example, manufacturer, wholesaler, jobber, retailer, government agency, public institution, individual consumer) or for purchasers located in different areas or for different quantities or grades or under different conditions of sale." Also it is provided that "no seller shall require any purchaser, and no purchaser shall be permitted, to pay a larger proportion of transportation costs . . . than the seller required purchasers of the same class to pay during March, 1942 . . ."

It is important for lime manufacturers to keep records to support their claims that their prices do not exceed their "ceiling" prices charged during March. For that purpose the regulation requires that they keep two kinds of statements available for examination by any person during ordinary business hours: (1) The highest prices which they charged for such commodities or services as he delivered or supplied during March, 1942 and his offering prices for delivery or supply, together with an appropriate description or identification or each such commodity or service; and (2) all his customary allowances, discounts, and other price differentials. Mr. Myers suggested that each manufacturer note, in connection with each current transaction and on the duplicate invoice or other record of it, the transaction in March which established the "ceiling" price for that particular commodity to the same class of purchaser.

Toward the close of the last session Arthur A. Hood, director of dealer relations of the Johns-Manville Sales Corporation, spoke, under the title, *World's Champions Are Two-Fisted,* of the necessity of winning the peace as well as the war. The former, he said, is a problem of distribution and it can be solved only by preserving the system of "free business enterprise." "Freedom of enterprise," he said, underlies all the other freedoms—free speech, free assembly, freedom of religion, etc. If we lose the profit system through prosecuting a total war, we shall lose the peace, he believes. He said that current attacks against capitalism really represent criticisms of profiteering rather than of the profit system. He believes, too, that a spirit of internationalism is needed to win the peace; the world must be looked upon more or less as a unit, inhabited by mankind as a species rather than by different nationalities and races.

The 1941 safety contest among lime manufacturers revealed a reduction in the accident-severity rate but an increase in the accident-frequency rate in relation to the total number of man-hours worked at competing plants. Forty-eight plants were enrolled in the contest, more than in any other year, and their combined period of operations totalled more than 7,000,000 man-hours.

The accident-severity rate was 4.49 per 1,000,000 man-hours of employment, a marked reduction from the rate of 6.24 for 1940. The accident-frequency rate rose from 30.7 per 1,000,000 man-hours in 1940 to 38.5 last year.

The most outstanding safety record was made by the plant of the Standard Lime & Stone Company at Bakerton, West Virginia, with 213,065 man-hours of operation without a disabling injury. Ten other plants operated during the year without accidents and all eleven were awarded certificates in accordance with the association's contest rules. The other ten plants are:

North American Cement Corporation, Martinsburg, West Virginia. — 180,624 man-hours.

Standard Lime & Stone Company, Knoxville, Tennessee. — 131,434 man-hours.

United States Gypsum Company, New Braunfels, Texas.—93,157 man-hours.

Warner Company, Bridgeport, Pennsylvania.—89,626 man-hours.

Marblehead Lime Company, Marblehead, Illinois.—69,888 man-hours.

Hawaiian Gas Products, Ltd., Honolulu, Territory of Hawaii.—38,224 man-hours.

Newala Lime Works, Newala, Alabama.—37,507 man-hours.

United States Gypsum Company, Cordova, Illinois.—37,171 man-hours.

Haden Lime Company, Houston, Texas.—26,468 man-hours.

Superior Lime & Hydrate Company, Pelham, Alabama.—23,110 man-hours.

The association's board of directors remains the same as last year except that District 5-B will be represented by E. C. Powers of the Marble Cliff Quarries Company, instead of Russell Rarey of that company. The elections in Districts 14 and 15 are not yet complete.

Those present at the convention included 50 individual producers (representing 32 lime-manufacturing companies), 6 persons representing the National Lime Association and other associations, 4 representatives of machinery-manufacturing companies, 3 representatives of the trade press, 16 guests and 11 ladies—a total of 90 persons.

Wyoming Planning Board Seeks Magnesium Plants

The Wyoming state planning and water conservation board adopted a resolution at its bi-annual meeting in Cheyenne, urging the appropriate federal agencies to take the necessary steps to sponsor and finance magnesium plants in Wyoming. The board further recommended and urged investigations and studies of all processes which contemplate the use of dolomite with any Wyoming materials and with priorities and aid for pilot plants for new processes.

INCREASES OUTPUT TO 150 TONS HOURLY

ABOUT three years ago the Myers Gravel & Sand Company, which had been producing at a deposit south of Anderson, Indiana since 1922, moved to a new location north of the city. Its new plant was described and illustrated in the October, 1939 issue of PIT AND QUARRY.

Until this summer all the material was excavated and supplied to the plant by a Sauerman slack-line cableway equipped with a 1-cubic yard bucket and supported by a 100-foot steel mast. Recently another Simplicity triple-deck screen was added and five new cylindrical steel bins with a capacity of 275 tons were erected, increasing the processing capacity of the plant to about 150 tons per hour.

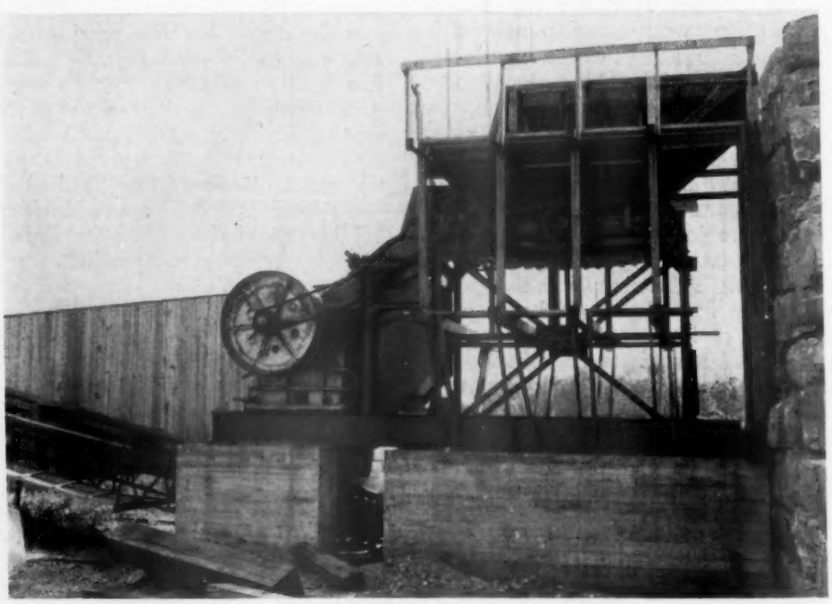
To step up the supply of raw material delivered to the plant so that this increased processing capacity could be fully utilized, the company has just installed a Pioneer all-steel belt-conveyor 275 feet long, equipped with 555 feet of 24-inch Goodyear belting. The conveyor approaches the plant from the west, the cableway pulling from the south.

Another deposit has been opened to supply the conveyor, the material being excavated by a Northwest 1-cubic yard drag-line and loaded into dump trucks. The trucks will drive up a ramp and discharge over a grizzly into a surge bin, from which a new Pioneer feeder will put the material on the conveyor for delivery to the plant. The oversize from the grizzly will be reduced by a 15- by 36-inch Diamond jaw crusher, the crushed product going on the conveyor also. Secondary crushing in the plant is taken care of by a 12- by 16-inch Universal jaw crusher. A shift in the arrangement of the screens, of which there are now three, will allow the production and storage in the new bins of 100-per cent. crushed material, or crushed and uncrushed sizes may be blended if desired.

The deposit, which lies along Killbuck Creek and parallels the old Alexandria Pike north of Anderson, is ideal—the answer to a sand-and-gravel producer's dream. Few large bowlders are brought up, there is no excess of fines to be wasted, and chert, shale or other deleterious materials are seldom encountered. Tests have indicated that this good material extends to a depth of at least 60 feet over most of the property, which consists of about 65 acres.

The plant of the Myers Gravel & Sand Company north of Anderson, Indiana. The new 275-foot conveyor approaches the plant from the crusher at the extreme left.

Looking up the new conveyor toward the plant. The stone wall at the left will form the abutment for an earthen ramp to accommodate the trucks from the newly-opened pit.



Hopper, feeder and jaw-crusher installation at the feed end of the new 275-foot belt-conveyor described in the text.

Barges Transport Material from Island Pit to New Illinois Gravel Plant

THE business of producing sand and gravel may, on the surface, appear to be a prosaic industry using cut-and-dried operating methods. To one familiar with the industry, however, almost every operation presents some new peculiarities which make it a little different from any other. The new plant of the Moline Consumers Company near Ottawa, Illinois, has many interesting features, but its chief deviation from standard practice is the method of procuring its raw material.

This plant, which went into operation on July 12, 1941, is located on the north bank of the Illinois River about 4 miles west of, and downstream from, Ottawa and near Buffalo Rock State Park. The deposit is on a 55-acre island about ¼ mile upstream from the plant and nearer the opposite side of the river. The deposit is about 28 feet deep and about 10 feet of it is above the river level, which is almost constant because of the Marseilles and Starved Rock Dams above and below it.

Clam-shell crane moving a barge-load of gravel into position for unloading.

This view of the plant shows the scalping and final-sizing stations. Loading boom-conveyor at left.

Walking drag-line being used as a crane. Stock-piling and car-loading boom conveyor at right.

The new plant replaced an old one 1½ miles farther west, or downstream, which was abandoned because suitable material was no longer available at that location. Originally built in 1915, this plant had also become rather dilapidated and much of the equipment was obsolete. For this reason only a small part of the equipment was used in the new plant. Toward the last the deposit at the old plant yielded excessive amounts of coarse gravel and bowlders which made it necessary to crush as much as 60 per cent. of all the material entering the plant. Under these conditions the plant's capacity was about 80 tons per hour.

The gradation of the material in the new deposit is much better. Although about 50 per cent. of the total plant feed must be crushed, most of this is 1- to 6-inch gravel. As there are very few bowlders the waste is negligible. The new plant also produces about 80 tons per hour, but does it with much less equipment and at considerably lower cost.

A Marion Type 351 gasoline crawler drag-line with a 1½-cubic yard Page bucket and a 60-foot boom is used to excavate the material at the new deposit and to load it on barges for haulage to the plant. This machine was mounted on a barge to excavate a 600-foot channel from the plant dock to the edge of the river and 300 feet through shallow water to the deep channel of the river. The same barge was used to bring the drag-line to the island. On the island this drag-line cut a short channel into the north side and this is being enlarged into a pond. In this way the barges will always be loaded in still water. The drag-line also removes the 1½ feet of overburden and overcasts it into the pond.

By W. E. TRAUFFER

Looking toward scalping screen from second conveyor. Crane feeds hopper in background.

View down first conveyor toward plant hopper. Return conveyor from crushers at left.

Three flat-top barges of 125-cubic yard capacity are used and these are towed one at a time to the plant by a tow-boat with a Buda Diesel engine.

At the plant dock the material is unloaded from the barges by a Koehring Number 501 crane equipped with a Wisconsin gasoline engine. The 1-cubic yard Owen clam-shell bucket used is a shallow type known as a snow bucket. The barges are moved for unloading, and are pushed out of the way when empty, by the crane. The crane discharges the material to the plant hopper or to reserve raw-material stock-piles from which it is reclaimed as needed. A grizzly over the hopper rejects any bowlders over 9 inches in size. A reciprocating feeder carries the remaining material to a 30-inch by 100-foot belt-conveyor which discharges it on the 3- by 6-foot Simplicity 3-deck vibrating scalping screen. Wire screen cloth with 3- by 4-inch, 1½-inch and 1⅛-inch openings is ordinarily used, but variations are made to meet demands.

The material passing over the top deck goes to a 6-inch Allis-Chalmers gyratory crusher, that over the other two decks usually goes to a 3-foot Symons cone crusher. The products of both crushers are then discharged on a 24-inch by 60-foot belt-conveyor which returns them to the first conveyor. Sometimes the demand requires that the gravel off the second deck must by-pass the crusher and go direct to the return conveyor. At other times 2-inch openings are used on this deck and the crusher is also by-passed.

The minus-1⅛-inch material passing through the bottom deck of the screen is carried by a 24-inch by 60-foot belt-conveyor to the top of the screening building. All the coarse sizing is done by a 4- by 8-foot Simplicity 3-deck screen which has wire screen cloth with 1-, ⅜-, and $\frac{3}{16}$-inch openings and is equipped with washing sprays. Only the bottom deck on this screen is ever changed, ⅛-inch openings being used when mason's sand is to be made. This arrangement of the two screens makes it possible to keep the same crusher openings regardless of the types of materials being produced.

Ordinarily the three sizes of gravel produced by this screen are discharged into three of the four 55-ton cylindrical, conical-bottom steel bins. On the day the writer visited this plant, however, ballast for the Chicago, Rock Island & Pacific Railroad was being made. A baffle plate was arranged to combine the two top sizes into one bin as ballast. The pea gravel, as always, dropped into its own bin. The baffle plate can be put in place or removed in less than 10 minutes.

The sand passing through the bottom deck of this screen goes through a spout into a 9-foot long Telsmith dewatering screw from which it is discharged into the fourth bin.

Trucks can be loaded from any of these bins through lever-operated arc side gates. For car-loading bottom-discharge gates feed a 24-inch by 45-foot horizontal belt-conveyor from the bins. These materials can be fed to this belt singly or in any desired blend. Ballast consists of a blend of 1⅛-inch gravel, ⅜-inch gravel and sand, with sand forming about 37 per cent. of the total. A 24-inch by 36-foot boom belt-conveyor is suspended by a cable from the plant. This conveyor can be raised and lowered and it can be swung by hand to load cars on either of two 1,700-foot spur tracks or on a stock-pile on the far side of the tracks. It can also be swung out of the way when switching is being done. A Monighan gasoline-powered walking drag-line with a 1-cubic yard clam-shell bucket is used to load cars from the stock-piles.

This 3-foot cone-crusher is used for reduction of 1⅛- to 4-inch gravel.

Sand from this 9-foot dewatering screw is discharged into bin.

The present capacity of the plant is held down by the fact that the scalping screen and the 6-inch gyratory crusher are not large enough. It is planned to replace them with larger machines which will increase the plant capacity to about 100 tons per hour. It will then be possible to use a 2-inch top openings on the scalping screen. The present loading and hauling equipment will be able to handle the increased flow of material without difficulty.

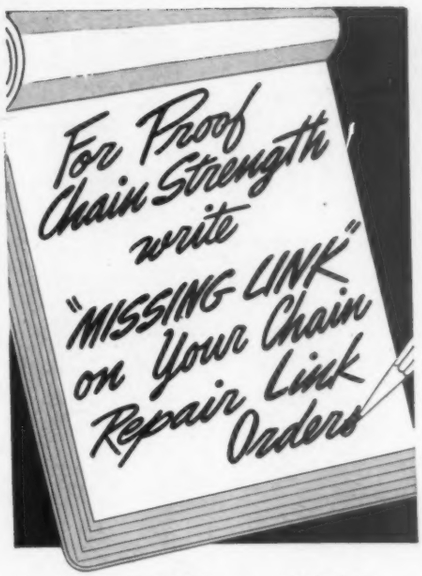
All truck shipments are weighed on a Winslow truck scale at the new plant office. Wash water is pumped from the river by two Dayton-Dowd 3-inch centrifugal pumps, one of which is used at a time. Barber-Greene belt-conveyors with Manhattan belting are used exclusively.

★ ★ ★ ★ ★

If you can't fight, lend! . . . . .

Buy Defense Stamps or Bonds

★ ★ ★ ★ ★



You get "Pressed Fit" only with genuine Laughlin "Missing Links"

The drop-forged, heat-treated "Missing Link" is press-fitted together under pressure, matching the parts so there is no play, no shearing action on the rivet. Under stress the rivet merely holds the "Missing Link" together, and does not take the load.

THE "MISSING LINK"

Drop-forged steel, heat-treated.
Sizes from 3/16" — 1 7/8"

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The link with larger inside dimensions.
Each link drop-forged and heat-treated.

Save time, increase safety by specifying
The Genuine "Missing Link"

Write for latest catalog on Laughlin Industrial Hardware.

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Look for Laughlin Products in Pit & Quarry Handbook

THE THOMAS LAUGHLIN COMPANY
PORTLAND, MAINE

PERSONAL MENTION

HARRY and JOSEPH JAEGER, operators of Jaeger Brothers, Inc., West Bend, Wisconsin, have purchased the property of the Northern Gravel Company near Barton, Wisconsin, and have moved their offices to the pit. CURTIS MAYO is plant manager.

P. P. Somerville

P. P. SOMERVILLE has been named to succeed the late Robert Gilmore as general manager of the Gilmore Wire Rope Division of the Jones & Laughlin Steel Corporation. He has been with Jones & Laughlin since 1938. Mr. Somerville's entire business experience has been in the wire-rope business, he having entered the production division of the Williamsport Wire Rope Company in 1929 upon his graduation from the University of Notre Dame as a mechanical engineer.

C. GRANNISS BONNER, formerly comptroller and more recently treasurer of the Brunswick-Balke-Collender Company of Chicago, has been elected treasurer of the Pomona Pump Company, Pomona, California. He relieves DONALD C. MCKENNA, vice-president, and former treasurer, who will devote full time to the increasing production activities of the company's four manufacturing plants.

WILLIAM M. BLACK was made a vice-president of the American Brake Shoe & Foundry Company at a recent meeting of the board of directors. He has been president of the American Manganese Steel Division since 1940 and will continue in that capacity.

J. H. KEMPSTER, superintendent of the Buffington, Indiana plant of the Universal Atlas Cement Company was elected president of the Indiana Manufacturers' Association at its 41st annual meeting held recently at Indianapolis.

J. D. NICHOLSON has been appointed general manager of the Mine & Smelter Supply Company of Denver. OSCAR H. JOHNSON continues as vice-president in charge of manufacturing.

Instead of a finger-pinching U-Bolt, put a real Fist-Grip Safety Clip on your wire rope. Four drop-forged flat bearing surfaces *hold* the rope without crushing or bowing, with far more strength than the rope-biting, rope-weakening U-Bolt.

And inexperienced help can't put it on wrong — its halves are identical. The dangers and slippage of the backward-applied U-Bolt are *impossible.*

For Full War Effort — 25% More Steel

Safety Clips, in an assembly as strong as a U-Bolt job, use 25% less steel. When you buy Safety Clips, that steel goes into guns and ships and planes. You need fewer clips, too — and there are no U-Bolt crushed rope ends to be cut off and thrown to waste. This adds up to considerable help to Uncle Sam.

Are You Getting These Safety Savings?

No rope bowing or crimping	rope saved
No battered, bent threads	clips saved
No special wrench	tools saved
Bolts on opposite sides	tightening time saved
Can't go on wrong	accidents saved
Fewer clips needed	clips saved
Fewer rope breaks	accidents saved

Distributed Exclusively Through Mill Supply Houses

Look for Laughlin Products in Pit & Quarry Handbook

THE THOMAS LAUGHLIN COMPANY
PORTLAND, MAINE

Murray M. Baker

Murray M. Baker has been appointed to the newly-created post of executive vice-president of R. G. LeTourneau, Inc. The new post was created to enable R. G. LeTourneau to devote a greater share of his time to the increased engineering activities made necessary by the war work of the company's four plants. Mr. Baker has been associated with earthmoving and heavy construction equipment since 1909 when the Holt Manufacturing Company, now Caterpillar Tractor Company, was first established in Peoria, Illinois. He has been a director of the company for the past four years.

MORTIMER R. PROCTER, prominently known in the quarry industries as vice-president of the Vermont Marble Company, has announced his candidacy for re-election as Vermont's lieutenant governor. He will seek renomination at the Republican primary election in September.

R. D. Ross, superintendent, Southern Rock Asphalt Company, Oklahoma City, is building a summer cottage on Veteran's Lake, near Sulphur, Oklahoma.

ROGER C. GLEASON, formerly with the Wallfill Company of Chicago, has been elected vice-president of the Wolverine Portland Cement Company.

JAMES W. WASHBURN, a partner in the Berkshire Gravel Company, Pittsfield, Massachusetts has been elected president of the Pittsfield Chamber of Commerce.

FRANK G. LUTH has been made mechanical superintendent of Iron & Steel Products, Inc., Chicago, dealer in used equipment. Until recently he was associated with the Fruit Growers' Express Company.

EUGENE T. ANDERSON, 45, a salesman for the Universal Atlas Cement Company for the last 17 years, died June 15 in a Milwaukee hospital. A native of Racine, Wisconsin Mr. Anderson was a veteran of World War I. He is survived by his wife, a daughter, two brothers and two sisters.

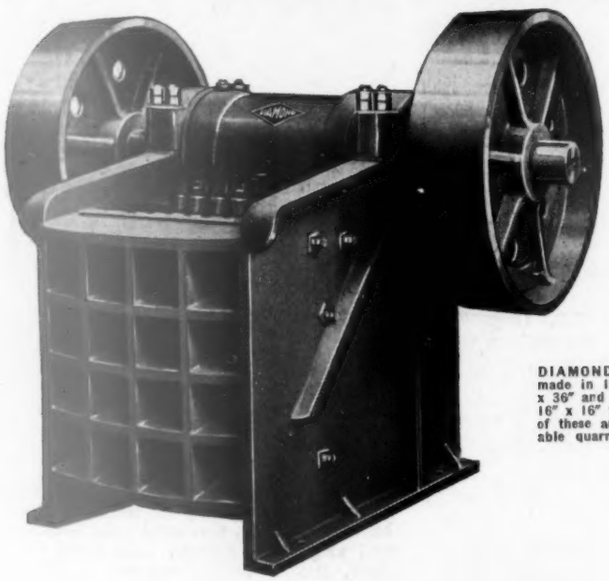
ROBERT F. RUNGE, vice-president of SKF Industries, Inc., Philadelphia, manufacturers of ball and roller bearings, died July 6 after a prolonged illness. He was 56 years old.

BURTON L. BOYE, president of the Asphalt Institute from 1933 to 1938, and formerly in charge of the asphalt department of the Standard Oil Company of New York, died at Summit, New Jersey, on July 9.

HENRY H. STEWART, assistant secretary and treasurer of J. K. Davison & Brother, Pittsburgh, died suddenly on June 23. He was 61 years old.

FREDERICK E. KURZ, 51, central division manager for the Eimco Corporation, died July 10, after an illness of two months, at an Elmhurst, Illinois, hospital. Mr. Kurz was a gradsate of the Michigan School of Mines and served as lieutenant in the Corps of Engineers during World War I. He had been actively engaged in the mining and filtration equipment fields during the past twenty-five years.

When You Buy a Crusher What Should You REALLY Buy?



DIAMOND Standard Jaw Crushers are made in 13 sizes from 6" x 12" to 24" x 36" and Roll Crushers in 6 sizes from 16" x 16" to 54" x 24", and various sizes of these are used in stationary or portable quarry plants and crushing units.

THESE are the things you should look for and **expect** in the crusher you buy:

1. A base heavy, rugged and properly reinforced to withstand the hardest crushing operations.
2. Pitman and plates (or rolls) carefully made of suitably hard material to give long and satisfactory use.
3. Proper **balance** for easiest running and consequent economy of power.
4. Delivery of **full** capacity.
5. Construction primarily based on the hardest type of crushing.

Don't buy on claims unless those claims can be thoroughly backed by performance records. And speaking of records, DIAMOND has some recent and very outstanding ones we're anxious to talk about. Either we, or any of our dealers will tell you all about it. In fact, we'd like to consult with you on **any** crushing, screening, conveying or elevating problem you have.

WRITE US or contact our nearest dealer for full details of DIAMOND ROCK, SAND AND GRAVEL EQUIPMENT. Free bulletins on request.

DIAMOND IRON WORKS, INC.
ESTABLISHED 1883
MINNEAPOLIS, MINNESOTA, U.S.A.

OCCUPATIONAL DISEASES and the LAW

Partial Causes

Kvernstoen v. Nelson et al., decided by the Supreme Court of Minnesota, February 20, 1942; reported at 2 N.W.(2) 560.

A dental assistant who became incapacitated as the result of dermatitis was awarded compensation under the occupational-disease provisions of the Minnesota Statutes (Section 4327). The statute specifically covers mercury poisoning and wood-alcohol poisoning. While there was evidence that the employee here used both mercury and wood alcohol in her work, there was evidence that these were only a part of the causes of the dermatitis, and "the problem is whether liability should fall upon her employers when other causes, in addition to the compensable elements recognized by statute, combine in bringing about her ailments." The court holds that "legal cause and its harmful effects having been shown by competent evidence, liability follows although other causes may have lent their aid," and the compensation award is affirmed.

Medical Board

Plaugher v. American Viscose Corporation, decided by the Superior Court of Pennsylvania, February 28, 1942; reported at 24 Atl. (2d) 698.

The Pennsylvania Workmen's Compensation Board awarded compensation under the Pennsylvania Occupational Disease Compensation Act of July 2, 1937, to the widow of a workman who, according to its findings, died of rheumatic heart disease and mitral stenosis, aggravated by carbon-disulphide poisoning contracted in an occupation involving contact with and exposure to carbon-disulphide fumes. On appeal, the Court of Common Pleas of Delaware County remitted the case to the board, with directions to submit the medical questions involved to the Medical Board provided for in an act of June 21, 1939.

In this review the Superior Court rules that it sees nothing contrary to the Pennsylvania constitution in a

How User of Dredge Cutterhead Blades *Conserves Manganese Steel*

As we all know, manganese is a metal indispensable to our war machine. It is used in the production of virtually every ton of steel made, not merely as a constituent of a high alloy steel like 13% manganese steel, but also as a "scavenger" in tonnage steels to remove weakening elements like sulfur and oxygen. While a relatively small amount of manganese is required per ton of rolled steel, the total necessary in the annual production of 85,000,000 tons of steel is impressive, particularly when we remember that the foreign sources from which high grade manganese ore is obtained are no longer fully available.

To assure maximum service, so necessary at this time, from equipment parts subjected to shock and abrasion, the use of manganese steel is essential; but, as in the cases of other vitally essential metals, we must be saving in the use of "new" manganese and in the reuse of metals containing it. Likewise, if it is possible to reclaim 13% manganese steel parts without remelting them, then by all means it should be done, even if there is no immediate "dollar" saving.

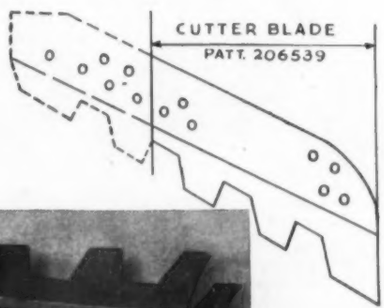
We've advocated for many years the reclamation of worn manganese steel castings by build-up welding, where the worn away weight is small in relation to the total weight of the piece. Now we can give an instance of another kind of reclamation where more than half the weight of a new casting was saved by a little ingenuity.

New "Toe Ends" Riveted On

A dredging company had found that in using on their suction dredge cutter heads the type of blade shown in picture (A-242), the wear on the "toe end" of the blade was so much faster than on the heel end that the latter remained almost intact when the toe end was badly worn. They had us cut the pattern in two and make a number of separate toe ends, which could be riveted to the cutter head very nicely when a suitable joint with the heel piece had been cut with the torch. Our outline sketch tells the story: the part in solid line is the portion we made for them to "wear out" the good section still available for service.

It is sensible to use Amsco Manganese Steel where ordinary steel parts would wear rapidly—but use it judiciously and reclaim wherever possible.

This is no time to cling to individual advantages—we recognize that, and are willing and anxious to do our part—*To Win This War!*



Amsco
AMERICAN MANGANESE STEEL DIVISION
OF THE AMERICAN BRAKE SHOE & FOUNDRY CO.
Chicago Heights, Illinois

Manganese Steel Castings for shocks and abrasion.
Chromium-Nickel Alloy Castings for heat and corrosion resistance.
Power Shovel Dippers. Dredge and Industrial Pumps.
Welding Materials for reclamation and hard-surfacing.

FOUNDRIES AT CHICAGO HEIGHTS, ILL.; NEW CASTLE, DEL.; DENVER, COLO.; OAKLAND, CALIF.; LOS ANGELES, CALIF.; ST. LOUIS, MO. OFFICES IN PRINCIPAL CITIES

provision giving to a board of three physicians the power to make conclusive findings on medical questions of fact. However, the board provided for in that act has never been appointed, and the effect of that omission, says the court, is that the Occupational Disease Compensation Act should be read and administered just as though the sections dealing with the appointment and functioning of the Medical Board had never been enacted. A court therefore can not direct the Workmen's Compensation Board to refer questions to the determination of a board that does not exist. The action of the lower court is, consequently, reversed, and the case is remitted to that court to hear and determine whether the compensation board's findings were sustained by the evidence and whether they support the conclusions of law and the award of compensation.

Reactivation of Disease

Milwaukee Malleable & Grey Iron Works et al. v. Industrial Commission of Wisconsin et al., decided by the Supreme Court of Wisconsin, February 10, 1942; reported at 2 N.W.(2d) 197.

The workman involved had worked as a molder in foundries for some 25 to 30 years, the last 15 or 16 years at the last employer's foundries. He quit work in 1936, and in 1937 had his right leg amputated above the knee because of tuberculosis of the knee joint. He had had tuberculosis during childhood and this had left a primary focus in the lung. An X-ray of his lung in 1932 disclosed a disputed stage of silicosis, as well as the old tuberculous infection. A later X-ray in 1937 showed no change in the chest condition. For more than a year before the operation he had suffered severely, and after the amputation he developed clinically-active pulmonary tuberculosis. The examiner for the Industrial Commission (which awarded compensation, from which this case is an appeal) found that his silicosis resulted from his occupation as a molder and his employment at the plaintiff's foundry; that the silicosis was a material factor in reactivating the pulmonary tuberculosis; that before the clinical activity of the tuberculosis the silicosis maintained the tuberculosis in a pathologically-active state; that the tuberculous condition of the knee was a result of the spread through the bloodstream of germs from the pathologically-active lesion in the lungs and hence that the worker suffered from an occupational disability.

The award was attacked upon the ground that it was based upon speculation. The Supreme Court, however, holds that the evidence and the inferences which the commission was entitled to draw support its findings and its award.

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LABOR DECISIONS

Contract

National Labor Relations Board v. Knoxville Publishing Company, decided by the U. S. Circuit Court of Appeals, Sixth Circuit, January 16, 1942; reported at 124 Fed. (2d) 875.

The employer involved in this case declined to enter into a written contract with a guild representing its editorial employees. The questions involved both provisions for wages, hours and other conditions of employment which did not exist at the time of the proceedings, and provisions for wages, hours and other conditions which did exist at the time. The court distinguishes between these two classes of provisions and rules that while the National Labor Relations Act does not compel an employer to enter into a written contract with the statutory representative of his employees in all instances, "it does compel him to agree in writing with such agent concerning wages, hours and the established usages or customs prevailing in the conduct of his business in regard to such matters." The refusal to contract with its employees' statutory representative as to wages, hours and working conditions which existed in the business was "in violation of the spirit and purpose of the National Labor Relations Act." The employer is therefore ordered to offer to enter into a written agreement with the guild on the matters involved.

Disability

McIntyre v. E. J. Lavino & Company, et al., decided by the Supreme Court of Pennsylvania, March 23, 1942; reported at 25 Atl. (2d) 163.

The widow of a worker who was disabled and later died of manganese poisoning found to have resulted from exposure to manganese dust in his occupation of operating a manganese-ore-drying mill was

awarded compensation under the Pennsylvania Occupational Disease Compensation Act of July 2, 1937, P. L. 2714, 77 P. S. Sections 1101 et seq. The award was contested on the ground that while the Act did not go into effect until January 1, 1938, the workman's last exposure to the manganese dust was in September, 1937. The worker did, however, continue in the defendant's employ until February 4, 1938, when he was discharged. On the 24th of that month he became totally disabled and was found to be suffering from manganese poisoning.

Occupational diseases, says the court, are, from a legal standpoint, peculiar in that they arise, not from an accident or event happening at a precise moment, but from a day to day exposure to unhealthful conditions over an extended period; the exact time of their origin is necessarily obscure and their insidious progress is not revealed until, frequently after a long interval, the disability which they create manifests itself. Under the Act concerned, it was the clear and manifest intention of the Legislature that the Act should apply to cases of disability arising after January 1, 1938, even though resulting from exposure to occupational disease hazards which had terminated before that time. "Even if the construction thus placed upon the Act of 1937 were to be regarded as giving it a retroactive operation, such interpretation would not make it unconstitutional."

"Surely," says the court, "it was not intended that, if an occupational disease arising in the course of the employment culminated in a disability which manifested itself after the employment had ceased, the disability could not be the subject of compensation, for otherwise, after an employee had been exposed to the hazard for years and the seeds of occupational disease had been sown in his body, his employer could discharge him and thus avoid compensation liability for a resulting disability which might reveal itself shortly, or even immediately, thereafter."

The compensation award is affirmed.

Building Employees

Fleming v. Arsenal Building Corporation et al., decided by the U. S. Circuit Court of Appeals, Second Circuit, December 30, 1941; reported at 125 Fed.(2d) 278.

This court holds that employees engaged in maintaining a building in which tenants manufactured goods for shipment in interstate com-

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merce are engaged in work "necessary to the production" of the goods and therefore "engaged in the production of goods for commerce" within the coverage of the Fair Labor Standards Act of 1938; a lower-court decision to the contrary is reversed. The court notes that "the question now at bar has come up a number of times when the ancillary service was performed by employees of the same employer who was himself 'engaged in commerce' and the result has been fairly uniform." Of five decisions of appellate courts which have dealt with employees of an employer who was not himself "engaged in commerce," the score is four to one against the view this court takes. In four it was held that the act does not apply to employees who are assisting in the work of another employer, himself "engaged in commerce." On the other hand, the Third Circuit Court has gone even further than this court has as yet found it necessary to go. "Obviously the question will not be set at rest until the Supreme Court makes an authoritative ruling."

Interstate Trucking

Rahgo v. Cities Service Oil Company, decided by the Municipal Court of New York, Borough of Manhattan, First District, February 3, 1942; reported at 177 Misc. 1059.

The plaintiff in this action was the operator of a truck hauling oil from a bulk-storage plant to retail distributors and large consumers. The truck at no time was driven across state lines. The oil was delivered to the storage plant by barges and trucks from other states. The employer claimed exemption from the Fair Labor Standards Act on the grounds that the plaintiff's occupation is within the scope of the Motor Carrier Act. The court rules, however, the plaintiff's duties do not fall within the meaning of "interstate commerce" as used in the Motor Carrier Act. The employer then urged that the Fair Labor Standards Act does not apply because it applies only where interstate commerce is involved. To this the court replies that this contention "overlooks the fact that the Motor Carrier Act applies to carriers and to those necessary to the operation thereof, and to transportation only, and the Fair Labor Standards Act applies not only to transportation or commerce but also to the production of goods for commerce." Here the employee as well as the employer is engaged in the production of goods within the meaning of the Fair Labor Standards Act, and the mere fact that the employee individually is not engaged in interstate commerce does not exclude him from the provisions of the act.

Subterfuge in Overtime

Murray et al. v. Noblesville Milling Company, decided by the U. S. District Court, Southern District of Indiana, Indianapolis Division, January 9, 1942; reported at 42 Fed. Supp. 808.

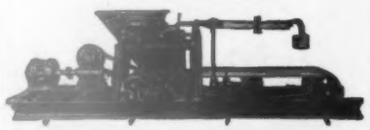
Most of the employees concerned in this case had always received a rate of 40 cents per hour and usually averaged 60 hours of work per week. After the Fair Labor Standards Act of 1938 was passed the employer announced an "arrangement" whereby the basic rate was reduced to 34 cents, so that with overtime compensation the pay for the average workweek of 60 hours would remain at $24. This "arrangement," says the court, "was a mere subterfuge. The evidence is equally clear that the employees neither understood nor ratified the 'arrangement.'" It is therefore the opinion of the court that the employer violated the provisions of the Fair Labor Standards Act and should be required to pay to its employees overtime compensation in accordance with the provisions of the act and based upon the hourly rate of pay that each employee was receiving prior to the "arrangement."

Company Union

National Labor Relations Board v. U. S. Truck Company, Inc., decided by the U. S. Circuit Court of Appeals, Sixth Circuit, January 16, 1942; reported at 124 Fed. (2d) 887.

An order requiring the employer to disestablish a company-dominated "benefit union" is held to be supported by the inferences the board was entitled to draw from the evidence, and will be enforced. An order requiring the reinstatement with back pay of two employees will not be enforced because there was testimony that the employes had violated the rule against intoxication; "where the order of the board as to reinstatement indisputably requires the employer to violate other statutes highly important to the public safety, even though union membership is found by the board to be the ruling motive for the discharge, this court has authority to vacate the

Over
One Thousand



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order as violative of public policy and contrary to law."

The board also ordered that amounts deducted from the salaries of members of the benefit union and paid into the treasury of the union be paid to the employees by the employer. The court finds "no theory of common law or equity under which the employer is liable to pay this sum," and that order will not be enforced.

Subpoena Power

Cudahy Packing Company of Louisiana, Ltd., v. Holland, decided by the U. S. Supreme Court, March 2, 1942; reported at 62 S.Ct. 651.

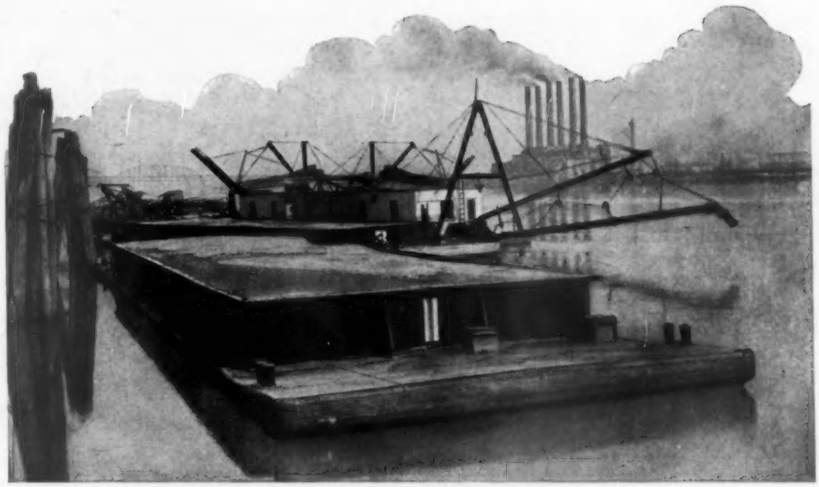
This decision settles an issue on which the Federal district and appellate courts have disagreed: whether or not the Administrator of the Wage and Hour Division has authority to delegate his statutory power to sign and issue subpoenas for the production of books and records, under the Fair Labor Standards Act of 1938. The Supreme Court holds that under that act the Administrator may through designated representatives gather data and make investigations, but that the act gives him no authority to delegate the subpoena power, and that no such authority can be inferred.

TRAFFIC News Digest

I. C. C. Reports

Cement.—Fourth-section application No. 18559. Cement from Alabama to Georgia. Authority granted by F. S. O. 14667, on conditions, to establish and maintain rates on cement from Birmingham, Leeds, N. Birmingham, and Phoenixville, Alabama to Columbus, Ellerslie, Flat Rock, Gentian, and Midland, Georgia, without observing the long-and-short-haul part of the fourth section. Temporary relief was provided by F. S. O. 13916.

Sand.—Fourth-section application No. 19295. Molding sand from Piggott, Arkansas to Wisconsin and Michigan. Authority granted by F. S. O. 14657, on conditions, to establish and maintain rates on moulding sand from Piggott, Arkansas, and intermediate points, to destinations in Wisconsin and Michigan as to which temporary relief was given by F. S. O. 14390, without observing



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Speedy, economical sand and gravel production is characteristic of Morris Hydraulic Dredges. Whether your deposits are loose, gravelly, compacted or clayey, you can assure most effective operation with a Morris Dredge.

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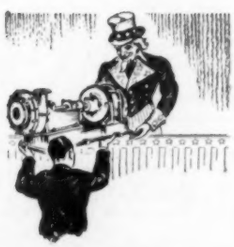

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We have placed at the disposal of the government all our facilities that might be of use in the national war effort. But our remaining facilities are at your service, and also the advice of our engineers to help you secure best results from your present equipment and to plan for your future needs.

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CENTRIFUGAL PUMPS

the long-and-short-haul part of the fourth section.

Motor Reports

Elmer, New Jersey.—MC 103351. William H. Beal, Jr., contract carrier. Permit proposed. Lime and limestone in truckloads from points in Pennsylvania to points in New Jersey.

Fertilizer and Lime.—I. and S. M-1973. Fertilizer and lime, from or to Maryland, Pennsylvania and New Jersey points. By Examiner Harold L. Seaman. Commodity rates minimum 10,000 pounds, on fertilizer from Carteret, New Jersey and Baltimore, Maryland, to Doylestown, Pennsylvania and points in Pennsylvania within thirty miles thereof. Also rates on lime from Norristown, Pennsylvania, to Bellemead and Rocky Hill, New Jersey. Proposed by Ernest L. Buckman, of Doylestown, a motor common carrier. Unjust and unreasonable. Schedules filed to become effective March 15, 1942, and suspended until October 15, 1942, on protest of rail carriers in trunk line territory and the Middle Atlantic States Motor Carrier Conference, Inc., proposed to be ordered cancelled and proceeding discontinued.

Clay Rates

Rates on clay have been checked by the Commission, division 2, in a report in fourth section application No. 19704, Imported Clay to Sheboygan, Wisconsin. An existing rate of 34 cents from Philadelphia without Ex Parte No. 148 increase, minimum 60,000 pounds, was marked for a reduction to 23 cents on a minimum of 80,000 pounds. It was stated in the report that previously the clay had been transported from ports *via* the inland waterways and the Great Lakes, but that transport by water has become uncertain in the interior of the country as well as on the ocean.

The net cost of transportation by water to Sheboygan was $4.54 a net ton. The proposed rail rate was to be $4.85 a net ton. It was stated in the report that the applicants expected water carriers to quote low charges for handling this and other west bound traffic so as to provide empty equipment at western terminals for eastbound traffic. However, due to war conditions there can be no reasonable assurance, says the report, that equipment for water transport will be available when needed. If it is available there is no assurance that the charges for such services will not be substantially higher than those incurred last year. On these facts the Commission concluded that the railroads had not made out a case warranting relief, and denied relief in the fourth section order No. 14691.

Central Freight Association

Docket 70959. — (Carrier's proposal). Crushed stone, in box-cars, carload, minimum weight 60,000 pounds. Establish a rate of $1.43 per net ton from Chicago to South Bend, Indiana.

Docket 70973. — (Carrier's proposal). Stone, crushed, in bulk, in open-top cars. Carload. Establish a rate of $1.27 per net ton from Speed to Evansville, Indiana. Ex Parte 148 increase to be added.

Docket 70975. — (Shipper's proposal). Sand, all kinds, and gravel, in open-top cars, only, carload minimum weight 90 per cent. of the marked capacity of the car except when car is loaded to full cubical or visible capacity, actual weight will apply. Establish a rate of 99 cents per net ton from Havens, Ohio to Marion, Ohio.

Docket 70990. — (Carrier's proposal). Refuse grinding sand. Cancel present rates on this commodity from Toledo, Ohio, to points in Michigan, published in P. M. R. R. Tariff 5694-J. Account obsolete. Classification basis to apply.

Docket 71061. — (Carrier's proposal). Firestone, rough quarried, carload, minimum weight 50,000 pounds. Revised present rate from Amherst and Berea, Ohio to Erie, Pa. to read $1.85 per net ton.

Docket 71095. — (Carrier's proposal). Sand, all kinds, and gravel, in open-top cars, carload. Revise rate on, from Cleveland to Chardon, Ohio, 94 cents per net ton, *via* the B. & O. R. R. direct, subject to Ex Parte 148 increase.

Docket 71096. — (Shipper's proposal). Sand, all kinds, and gravel, in open-top cars, carload. Establish on from Akron, Ohio to Lordstown, Ohio 66 cents per net ton, subject to Ex Parte 148 increase.

Docket 71097. — (Carrier's proposal). Rip-rap, carload. Establish on, from Joliet, Ill., to Stations on the C. M. St. P. & P. R. R., West Dana, Indiana, to Terre Haute, Indiana 97 cents, plus $2.97 per car. Subject to Ex Parte 148 increase.

The H. K. Porter Company, Pittsburgh, has announced plans to open a plant in Blairsville, Pennsylvania, expanding its facilities in the war effort. The company's regular products include locomotives and a complete line of chemical processing equipment.

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Complete plants designed and equipped, including Screens, Elevators and Conveyors. Machinery for Mines and Rock Quarries, Sand and Gravel Plants. Engineering Service.

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● Drifter Drill

New features have recently been added to the well-known X-71WD Drifter, manufactured by Ingersoll-Rand Company. This drifter has been developed for wagon-drill service, in which the drilling of deep holes is usually required. New features include a positive method of blowing—a method which directs more blowing air through the drill steel. Thus, little air escapes around the sides of the shank.

This is considered a major improvement over the method formerly used,

The wagon-mounted drill

since it virtually eliminates the wastage of air and directs a strong, steady current to the bottom of the hole—where it is needed for cleaning.

The X-71WD has a longer stroke and a heavier piston than any other drill. These features provide strong rotation and striking force necessary to overcome the inertia of a heavy drill steel; they also allow the use of larger bits. The combination of these factors explains the success of the X-71WD in deep-hole wagon drill work.

● V-Belt

Announcement is made by The B. F. Goodrich Company, which a short time ago introduced new lines of static-discharging and oil-resistant V-belts, that these lines are now being carried in stock in all popular sizes of A, B and C cross-sections. Previously the belts had been made only on special orders.

Great interest followed the initial announcement of the company that it was producing static-discharging V-belts, usable to reduce the hazards in many segments of defense industries, including powder and chemical plants.

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Thus protected, a reclaimed unit outlasted a new pump... the entire rebuilding cost, including labor, material, and power, totalled only $200.00 against a new pump cost of approximately $900.00! Furthermore, pump parts could be rebuilt many times before finally being discarded, thus multiplying their original life enormously.

This is but one typical example of the many profitable applications for hard-facing sand and gravel equipment. If you have a wear problem, write Stoody Company, Engineering Research Department, giving full information. They will be glad to make recommendations without obligation.

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is in what it costs per yard per 100,000 yards. On that basis a HAISS will prove out to cost you less than anything else we know of . . . Write for catalog.

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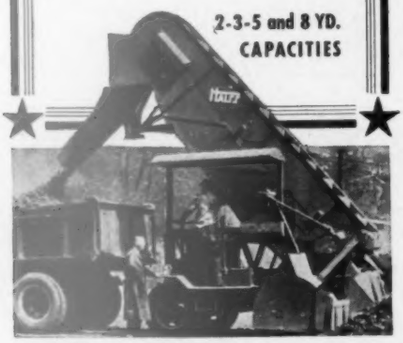

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Self Traveling Tractor
JAW CRUSHERS
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The Bemis Rip-Cord Closure is a new method of closing cotton and burlap bags which provides a simple, quick means of opening them without injury. The rip-cord is sewn into the closure of the bag with a regular two-thread bag-closing machine. Only minor inexpensive adjustments are necessary to adapt the machine to sewing the rip-cord. A quick jerk of the cord opens the bag instantly. The bag is not torn or damaged and valuable time has been saved.

Tops of bags closed with wire ties are apt to get snagged in handling, shipping or opening. Bags sewn on bag-closing machines are usually opened by cutting the stitching with a knife and frequently the cloth is damaged. The possibility of injuries of this nature to bags is eliminated when the new rip-cord closure is used.

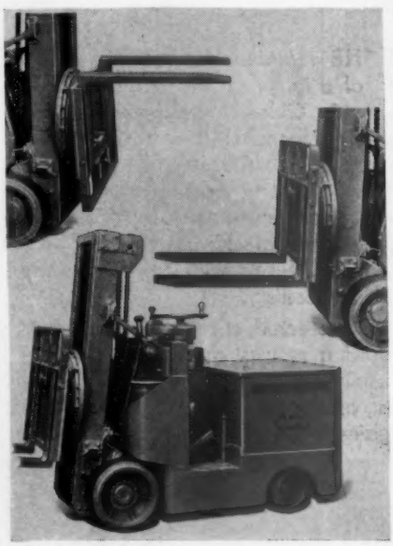
● Lift Truck

The Elwell-Parker Electric Company, Cleveland, is supplying its center-control truck, Type F-23T, with forks on a rotating base capable of making a complete revolution. Should the work call for only a partial revolution, however, the base can be provided with stops to limit the swing to any angle up to 180 degrees.

Rotating forks increase the usefulness of the truck and adapt it to a wider variety of jobs. At top position, the forks carry either suspended or supported loads, the latter for extra high tiering. When locked into place at the bottom, they handle pallets or low skids with no adjustment whatever. For handling roll paper, the forks are interchangeable with rotating apron to pick up or deliver roll on end or side.

The truck is electric-powered, with front-wheel drive and rear-wheel steer. It handles up to 4,000 pounds and travels up to 5 miles per hour with full load. Tilting uprights are 83 inches high when telescoped and can be extended to 140 inches high.

The travel brake is foot-operated. When the operator steps from his position on the truck, the power is shut off and the brake applied automatically. Speed on ramps is controlled by dynamic brake. The truck is listed under the Underwriters' Laboratories' re-examination service.



Views of the truck and fork positions.

TRADE NOTES

The Union Wire Rope Corporation of Kansas City is the newest member of the industry to be awarded the Naval "E" for excellence in recognition of outstanding service to the war effort. The official presentation of the blue burgee was made in a ceremony at the Kansas City plant on Wednesday, July 8.

* * *

The Ransome Concrete Machinery Company, Dunellen, New Jersey, has appointed the American Steel Supply Corporation, Fort Wayne, Indiana, to handle its line of construction equipment in certain sections of Indiana.

High-Capacity Screens
● Designed especially for damp, sticky, and fibrous materials—Speeds up production!
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August 1942

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August, 1942

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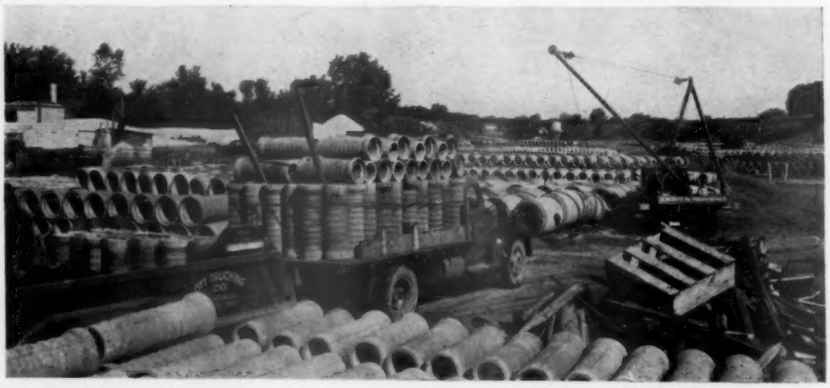


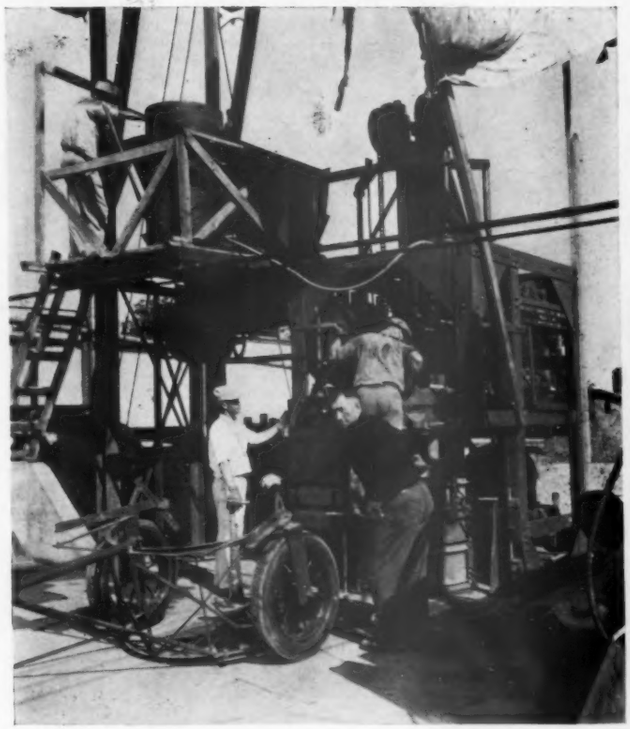
Truck and trailer being loaded in the yard of the Illinois-Wisconsin Concrete Pipe Company at South Beloit, Illinois, for delivery to a new ordnance plant under construction "somewhere in Wisconsin." (Story on following page).

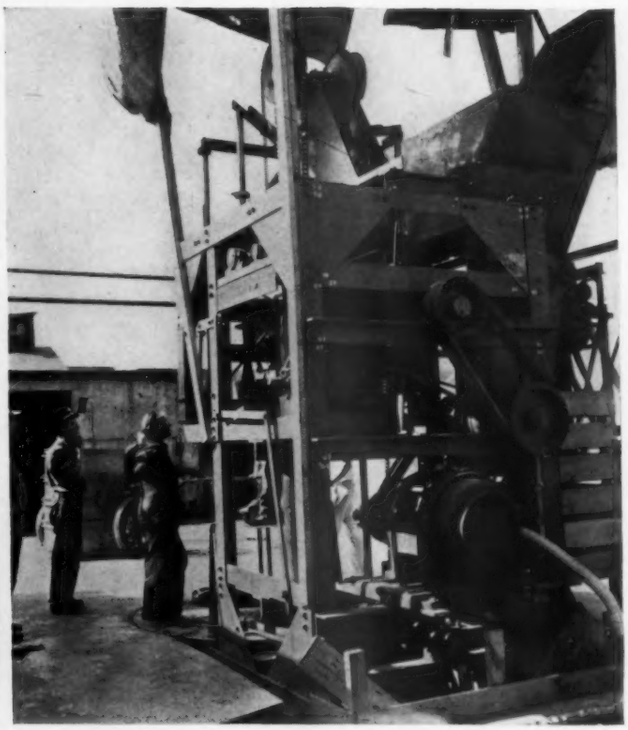
Reinforcing cages being formed in the yard at South Beloit to serve the new concrete-pipe machine recently set up.

Tractor-drawn low-bed trailer used to carry the pipe sections from the curing rooms to open storage in the yard.

One of the kilns being filled with 30-inch pipes produced on the new machine.

Adds Third Concrete-Pipe Machine to Cope With War-Construction Demands

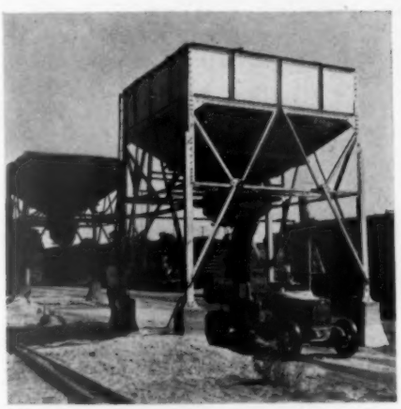




Two views of the new pipe machine just set up in the yard adjoining the twin plants of the Illinois-Wisconsin Concrete Pipe Company at South Beloit. (Other pictures on opposite page.)

CONCRETE pipe is experiencing the biggest demand in its history as war-plant, cantonment, and airport construction goes forward at a feverish pace. One of the companies feeling the tremendous effect of this program is the Illinois - Wisconsin Concrete Pipe Company of Chicago whose twin plants at South Beloit, Illinois, have been working night and day for months to supply the tubes to war-construction jobs in Illinois and Wisconsin. More than 90 per cent. of the output is going into army and navy training centers and ordnance plants being erected in these two states.

In an attempt to keep pace with the orders as they come rolling in, the company has just installed a new McCracken Model T roller-type packer-head machine, made by the Concrete Pipe Machinery Company of Sioux City, Iowa. As soon as the machine was set up outside the plant, it began turning out product in 4-foot lengths and in sizes from 4 to 36 inches in diameter. Tarpaulins were stretched overhead to keep the blazing sun from drying out the concrete, while concrete-block walls for a building to house the new machine were started, to be completed at some future date. A 42-cubic foot Stearns mixer and skip supply the machine with concrete. Storage bins for aggregates and cement will be erected later on. For the present, a dump-truck charges the mixer from a short wooden ramp, the truck obtaining the dry-batched materials from a Butler batching plant located a short distance away on the property.



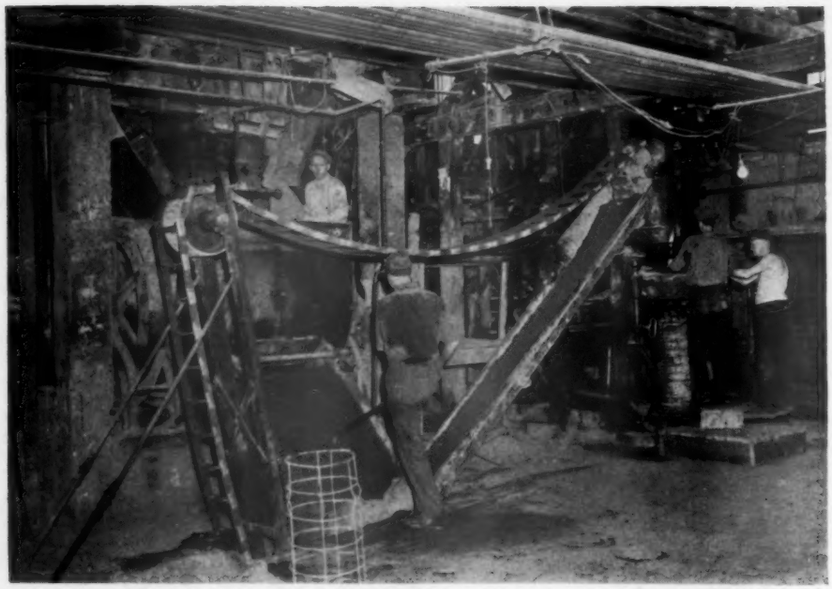
Dump truck being charged with dry-batched materials for delivery to the mixer.

The new machine is the third McCracken unit to be installed by this company, the first having gone into service in 1918 and the second in 1929. The original machine, replaced in 1929 by a Model S unit, is still being used in the plant of the North Star Concrete Pipe Company at Mankato, Minnesota. The Model S machine is the production unit now operating in one of the twin plants at South Beloit. It makes plain and reinforced pipe 3 feet long and in diameters up to 24 inches, and is served by a Blystone 21-cubic foot mixer, the concrete being carried to the hopper of the machine by a drag conveyor. Aggregates are stored in four bins, each of 120 tons capacity. These supply a 30-ton batching hopper located above the mixer, a bucket elevator keeping the hopper filled. Butler volumetric batchers measure out the ingredients. Two-wheeled pneumatic-tired carts are used to carry the "green" pipe sections from both old and new Mc-

By HARRY F. UTLEY

Cracken machines to the curing rooms where the steel forms are quickly stripped off.

The second of the twin plants houses a Quinn Model K pipe machine. It was placed in service in 1930 and is employed in the production of the larger pipe sizes—from 21 to 60 inches in diameter and in 4-foot lengths. Storage bins in this plant supply a 30-ton Butler steel hopper with aggregates *via* another bucket elevator. The materials are batched by two Taylor weighers into a Blystone 28-cubic foot mixer. The concrete is fed to the machine by a drag conveyor. Freshly-made sections of pipe are taken from the machine by a 3½-ton Shaw overhead bridge crane, allowed to remain on pallets on the plant floor for several hours until "set," and are then rolled into the curing rooms.



Another pipe machine similar in design to the one just placed in service. This one has been operating since 1929.

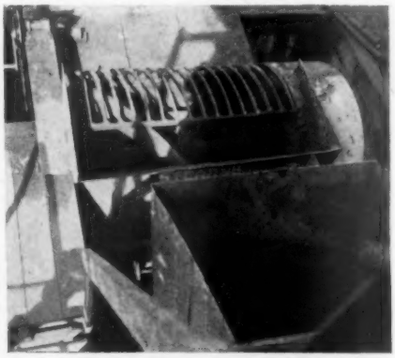
Each of the plants has nine large-capacity curing rooms. In the summer, moisture is supplied by McCracken spray nozzles tapped into water lines strung overhead through the kilns, while in the cold months live steam furnishes both heat and moisture. The steam pipe-lines are located close to the floor for efficient distribution of heat. A stoker-fed 150-horsepower boiler generates the steam, the 80-foot stack rising from the boiler-house being made of 30-inch concrete-pipe sections. A portion of the yard is also piped with overhead sprays for additional moist curing.

This is the machine which, since 1930, has been making large pipes up to 60 inches in diameter.

The pipe sections are carried from the curing rooms to the yard by three low-bed trailers drawn by small Fordson and McCormick-Deering tractors. The company also owns five Fruehauf and Highway semi-trailer outfits pulled by Mack and International tractors for making deliveries. This delivery fleet is large enough to handle shipments in normal times but with the huge demand this summer, several hired trucks and trailers have been pressed into service to carry the pipe sections to the sites of the various jobs.

All the aggregates used come from the company's own sand-and-gravel plant located close by. This plant, formerly owned and operated by the Atwood-Davis Sand Company of Chicago, was improved and enlarged several years ago when its operation was taken over by the Illinois-Wisconsin Concrete Pipe Company and now has a capacity of about 2,200 tons per day, including an ample proportion of crushed material. Aggregates are brought to the pipe plants in gondola cars and are unloaded into the bins by Ohio and McMyler 20-ton locomotive cranes equipped with 1½-cubic yard clamshell buckets.

Operations at South Beloit are under the supervision of Arnold "Jack" Melahn and William G. Zulauf. Pipe-production foreman is Ned Taylor and Robert Ritt is the shipping foreman. Main offices are located in the Builders' Building, 228 North LaSalle Street, Chicago where J. D. Mollendorf, president, maintains his headquarters.



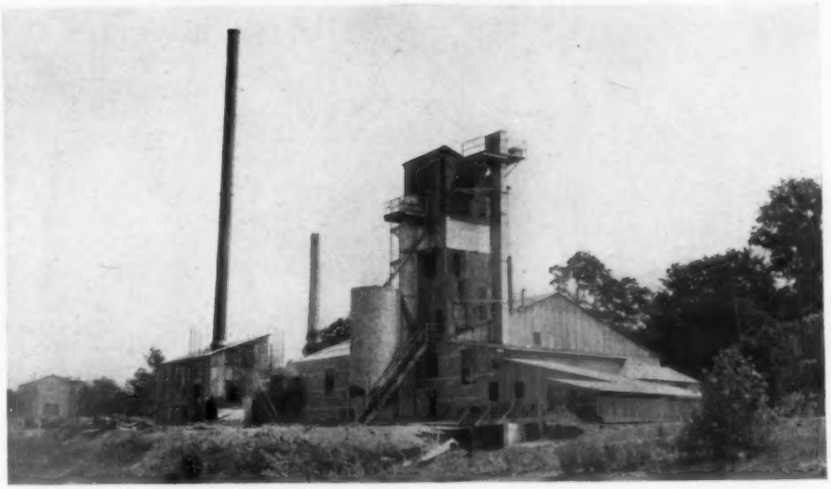
Mixer and skip which serve the new pipe machine.

Modern Handling Methods Save Labor at New Block Plant in Pennsylvania

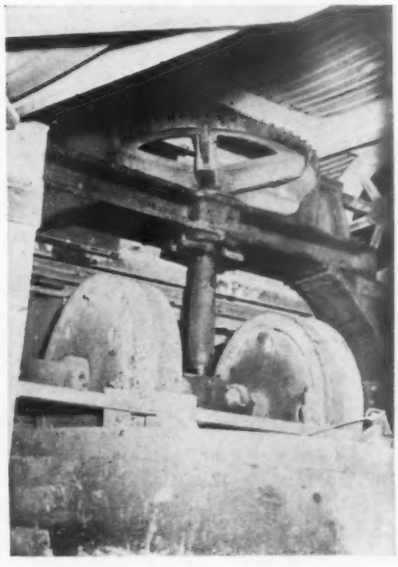
A FAR cry from the days of the old side-line, "back-yard" concrete-unit operation is the new, high-efficiency plant of the Grays Ferry Brick Company in West Conshohocken, Pennsylvania on the south bank of the Schuylkill River, 12 miles northwest of Philadelphia. Here a small force of men, doing very little manual labor, produces and cures as many pallets per hour as more than twice the number of employees could produce and cure in the company's former plant, and the products are of improved quality.

The Grays Ferry Brick Company was organized in 1928 to succeed the Mt. Gretna Brick Company, of Mt. Gretna, Pennsylvania, and devoted its efforts exclusively to the production of sand-lime brick, developing its plant capacity to 1,000,000 bricks per month. In 1934 cinder-concrete-block equipment was added and facilities were expanded from year to year until, in 1941, cinder-concrete-block production at the company's Philadelphia plant at 51st Street and the Schuylkill River was 3,000 12- by 18-inch pallets per 8-hour shift. Sand-lime bricks are being produced at the rate of 30,000 per shift in the company's Iona, New Jersey plant.

Dissatisfied with the lack of uniformity in commercially available cinders, although by no means considering the discontinuance of cinder-concrete-block manufacture, the company executives investigated other lightweight aggregates, finally deciding to use Waylite, a cellular slag, as the aggregate for an additional line of concrete products. The strength, fire resistance, insulation, acoustical properties, durability, light weight, low absorption and moderate cost of Waylite, combined with its controlled uniformity, purity and light color, were such decided advantages that arrangements were made with the Alan Wood Steel Company of Conshohocken to install equipment for the manufacture of this aggregate.



General view of the new plant, showing cylindrical bulk-cement-storage tank.



The dry-pan grinder.

Limitations of working area at the 51st Street and Schuylkill River plant, as well as transportation problems, made it obvious that the erection of a new concrete-unit plant on a larger property and closer to the source of the supply of Waylite was highly desirable. Property was secured within what might be called easy railroad-switching distance of the Alan Wood plant, and the Philadelphia concrete-unit plant with all its usable equipment was torn down, moved to West Conshohocken and rebuilt in four months.

Prior to and during the rebuilding numerous changes were made in the equipment and its location from those existing in the Philadelphia plant in order to avoid production-delaying cross-currents and to improve the quality of the finished products. Not the least of these changes was the arrangement and choice of equipment to enable either cinders or Waylite expanded slag to be used as aggregate, and to be handled, batched, mixed, molded and cured without duplication of machinery. Even such items as chutes were first made experimentally of wood to see how they worked before making them of metal for permanent installation.

The new plant, designed by and erected under the supervision of Earl N. Kunkle, plant superintendent of the Grays Ferry company, is planned for the production of 3,000 12- by 18-inch pallets of cinder-concrete blocks per 8-hour shift (the same capacity as the former Philadelphia plant), or the production of 1,500 18- by 26-inch (note the larger size) pallets of Waylite-concrete blocks per 8-hour shift. However, instead of employing 23 to 26 men on a shift, as was the former practice, the new plant uses only 10 men per shift, under John W. Kunkle, plant foreman. The men on any one shift consist of the foreman, 1 man on incoming raw materials, 1 man on weighing and mixing, 2 men on molding, 1 man on the high-lift truck, 1 man on the low-lift truck, 2 yard men and 1 engineer. When only one shift per day is working, there is also a night-en-

By SPENCER JONES

Another plant view showing the production building and machine "ell" in foreground.

gineer, but for a 2-shift day this night engineer would be the tenth man on the second shift.

Incoming cinders arrive usually by motor truck. To avoid delays in case truck transportation is interrupted a reserve pile of 1,000 cubic yards of cinders is maintained, and in cases of emergency these reserve cinders are loaded out into motor trucks with a 5-horsepower portable chain-bucket loader and hauled a short distance to the plant's aggregate receiving hopper.

Waylite expanded-slag aggregate is shipped by railway in hopper-bottom cars from the near Alan Wood plant. Both aggregates are dumped into a common hopper, which has both tracks and a plank runway over it to accommodate railroad cars or motor trucks. The aggregates, of course, are not intermingled, hence the hopper and all the equipment between it and the storage bins is cleared of one type of aggregate before another type is dumped into the common receiving hopper.

The weigh-batching equipment.

Beneath this is a 24-inch 6-ply rubber feeder belt, driven through a Link-Belt chain drive, by a 3-horsepower electric motor and traveling at a speed of 125 f.p.m.

The feeder belt delivers aggregate to a 24-inch 6-ply rubber main conveyor belt powered, through a speed-reducer and Morse silent chain, by a 5-horsepower Lincoln motor and traveling at a speed of 125 f.p.m. up a grade of about 17 degrees over Robins idlers and Robins head and tail pulleys.

Cinder aggregate is delivered by the main conveyor belt *via* a chute to a dry-pan grinder.

When cinder aggregate is being ground for making larger-sized or solid blocks, from 6 to 8 perforated sector-shaped plates are set in the outer ring. Weighted, hinged and spring-controlled scrapers, in fixed positions sweep the cinders in the pan under the rolls until the ground particles are small enough to pass through the perforations in the sector-shaped plates. When very fine grinding is required, as for thin-walled blocks, only 2 or 3 perforated sector-shaped plates are set in the outer ring, the rest being solid plates. The rotation speed of the dry pan is about 30 r.p.m. The motor has ample power for the purpose and although the device is nearly half a century old it is still giving entire satisfaction.

Ground cinders, passing through the perforated plates of the dry-pan grinder, are chuted into the boot of a Link-Belt bucket-elevator.

Waylite from the main conveyor belt is also chuted to the boot of this elevator, by-passing the dry pan entirely. No grinding is done on the Waylite at the plant, that being a function of the manufacturer of the aggregate.

The bucket-elevator has 8- by 10- by 12-inch malleable-iron buckets on a 14-inch 6-ply rubber belt. Power is supplied by a 10-horsepower Century motor driving through a Link-Belt double roller-chain to a geared countershaft and gear train, giving the elevator a speed of 250 f.p.m.

Aggregate, either ground cinders or Waylite, is delivered by this elevator to a chute, in the lower portion of which is a Y with a diverting damper. One branch of the Y feeds a 100-cubic yard steel storage bin, the other branch a 50-cubic yard steel storage bin. Both bins are housed in a high structure some 55 or 60 feet above the ground. Beside these two bins is a third bin for Portland cement. This is a "working" bin with a capacity of 80 barrels. Shipments of Portland cement come in bulk in special hop-

The 40-cubic foot mixer.

per-bottom cement cars. The same railroad siding is used for Portland cement cars as for the Waylite cars and there is ample space between the places where the various cars need to be "spotted" with room toward the "dead" end of the siding for "spotting" other cars.

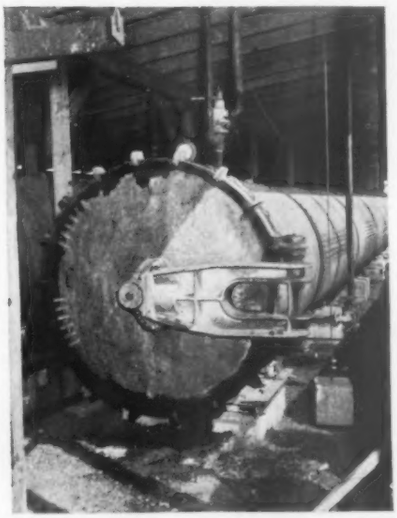
Cars of bulk Portland cement are "spotted" over a small cement hopper beneath the siding track, and special canvas pipes with angle-iron frames at their upper ends are attached to the bottoms of the opened car hoppers. The cement hopper is really the receiving end of the trough of a 9-inch Link-Belt screw-conveyor.

This screw-conveyor, which revolves at 100 r.p.m., has a half-pitch screw on the first, or receiving, section, and standard pitch on the remaining sections. It is driven by a 3-horsepower General Electric mo-

tor through a Link-Belt roller-chain.

Portland cement is delivered by the screw-conveyor into the boot of a Link-Belt bucket-elevator which has 5- by 9-inch malleable-iron buckets on a 10-inch 6-ply rubber belt. This elevator is gear-driven at 250 f.p.m. by a 7½-horsepower General Electric motor and delivers cement to the previously mentioned "working" bin.

Between the railroad siding and the tall structure in which the bins are housed is a vertical cylindrical steel bin with a capacity of 400 barrels of cement. This bin is for bulk storage. It is filled from the top through a 10-inch sheet-steel sloping pipe. As the cement that is being elevated into the 80-barrel "working" bin fills it to overflowing, the overflow slides down the pipe at a steep angle into the top of the bulk-storage bin. Removal of cement from this bin is accomplished by opening a valve in a discharge pipe in the bottom of the bin and allowing the material to flow into the 9-inch Link-Belt screw-conveyor previously mentioned. Thence the cement is carried to the bucket-elevator and delivered again to the "working" bin.



One of the autoclaves showing the quick-closing door.

Beneath the cement "working" bin and the two aggregate bins are the weighing-batch hoppers and the double-beam scales. These are products of the Butler Bin Company. The aggregate hopper has a capacity of 40 cubic feet and the Portland-cement hopper a capacity of 8 cubic feet.

The weighing - batch hoppers dump their measured contents into a 40-cubic foot mixer, made by Besser. Driven by a 25-horsepower Robbins & Myers motor through 6 V-belts and a train of gears, the mixer blades operate at a speed of about 30 r.p.m.

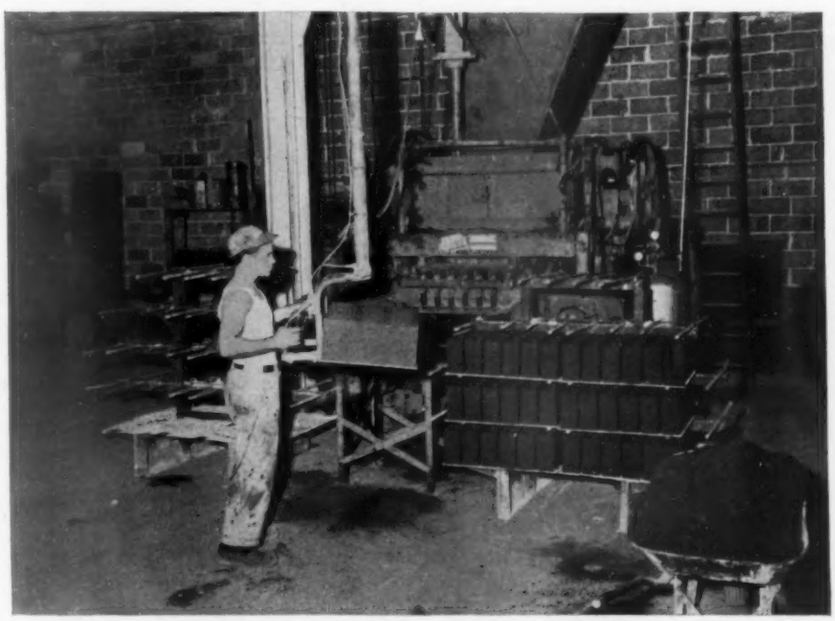
The mixer drops its load into a steel hopper which holds 160 cubic feet of reserve mixed material.

In the production room beneath the reserve mixed-material hopper the units are molded in a Besser Super Vibrapac plain-pallet stripper. This machine is driven by a 5-horsepower Fairbanks - Morse motor through a double V-belt reduction. The drive is equipped with a Stearns electric brake. Twin vibrating motors, also 5-horsepower Fairbanks - Morse, drive the vibrating shafts through V-belts. The agitator motor is a 1-horsepower Century, operating through a single V-belt drive. The pallet-spraying equipment is De Vilbiss. A Curtis pneumatic hoist is used for bearing off the loaded pallets. Compressed air for this hoist is supplied by a small compressor driven by a 3-horsepower Peerless motor and stored in a 30-cubic foot tank under 100 pounds pressure. The units produced by the Vibrapac are good looking, have an interesting texture, are extremely strong and their density is closely and uniformly controlled.

From the time the units are taken from the Vibrapac machine until they are safely deposited in the long autoclaves extremely careful handling is required, as they are very fragile until they are cured. This problem was carefully studied in the former Grays Ferry plant, where unsprung flat hand-cars on tram tracks of narrow gage were once used between a precuring room and the high-pressure steam-curing cylinders. Turntables were used instead of curves and switches, and jack-knife bridges provided entrance to the autoclaves. The numerous rail joints at the turntables and bridges caused sudden jolts which resulted in the spilling of loads and the creation of hazards to workers.

Low-lift electric truck running a load of units into a curing cylinder.

The hand-cars were left in the steam-curing cylinders or autoclaves during the curing process for a period of 10 hours, through 8 hours at a pressure of 125 pounds per square inch and a temperature of 354 degrees F. This frequently resulted in the freezing of hand-car bearings, making it almost impossible to remove the loaded cars from the cyl-



The automatic block machine and off-bearing hoist.

Rack of freshly-made units being picked up by the electric lift truck.

inder, and necessitating the removal of their loads by hand to other cars, unit by unit, in cramped and extremely hot working space.

When the hand-car transfer system was used the impossibility of moving the units smoothly made it necessary to take freshly-made cinder-concrete units from the molding machine by conveyor to the previously-mentioned precuring room, where they had to stay for 12 hours in steam at atmospheric pressure. The reason was that the units in an uncured condition are too fragile to stand immediate tiering, and at that time the management had no other way of stacking them.

This made two additional handlings necessary—unloading in the precuring room and reloading for transfer thence to the steam-curing cylinders—attended by considerable breakage of units due to their fragility.

The Grays Ferry company executives investigated skid racks which were being successfully used to hold extremely fragile materials, such as green cores in foundries, during transferring and decided to replace their hand-cars with a skid-rack-lift-truck system.

The hand-cars were converted into skid platforms by removing their axles, wheels and bearings and substituting runners. Skid racks were designed and built especially for holding pallets of concrete units during the transfer and fastened to the skid platforms. The runners were placed far enough apart so that they would just clear the vertical sides of steel troughs (like oversized coal chutes) which were substituted for the tram tracks inside the autoclaves, and sections of which replaced the former jack-knife tram-track bridges from the production-room floor to the autoclaves. These steel troughs and the close-fitting runners of the skid platforms served to guide loads into the cylinders and maintain proper clearances with the inner walls.

Then a Yale M4L elevating-platform type spring-suspended, low-lift electric truck, powered by 24-cell C8 batteries, was purchased to effect the transfer of freshly-molded units direct from the molding machine to the autoclaves. There were formerly turntables in the tram tracks in front of the molding machines, used when solid brick (which is much less fragile) was transferred on the hand-cars direct to the autoclaves. These turntables were left in place but the tracks were removed from them, and the skids with their skid racks being loaded from the molding machine rested on them and were turned around when the near side was loaded so that the other side could be loaded more easily.

Immediate results were the net reduction of 12 hours in the total production time, due to the elimination of the precuring treatment; a complete absence of delays due to frozen hand-car bearings in the hot autoclaves; increased speed and smoothness of transfers; and a tremendous reduction in the breakage and working hazards.

This solution of the problem of transferring units from the molding machine to the autoclaves was worked out in a preliminary but entirely practical manner at the company's former plant. When the new plant was constructed at West Conshohocken all the advantages of the new transfer system were retained and several new ones added.

The Yale low-lift electric truck had proved so good that it had ample even, vibrationless pick-up power for the smooth, easy and rapid handling of heavy loads of fragile material that it went to West Conshohocken as a matter of course. In fact it has been given an additional job or two. One of these jobs is the picking up and turning around of the skids and skid racks after they have been loaded on the side nearest the molding machines, thus enabling the empty sides to be loaded more easily. There are no turntables at the new plant and the low-lift electric truck does the work of the turntables in an entirely satisfactory manner. Another job is the transfer of cured units from the autoclaves to a junction point with the high-lift gasoline-powered truck used in stacking finished units in the storage yard.

The batteries of the low-lift electric truck are exchanged between shifts by sliding them in and out of the side of the truck. A charging unit, automatically regulated, replenishes the charge in each set of batteries at relatively small cost.

Curing of the concrete units is done in three autoclaves, two of them 6 feet inside diameter, one 68 feet and the other 70 feet long, respectively, and the third one 6½ feet inside diameter and 62 feet long. All three autoclaves are fitted with a new type of quick-closing doors manufactured by the McCarter Iron Works. These doors are latched and unlatched by means of a long steel lever which is operated by the gasoline lift truck used for stacking finished units in the storage yard.

High-lift gasoline-powered truck at work in the yard.

John W. and Earl N. Kunkle examining one of the lightweight units.

Steam for the autoclaves is furnished by a 250-horsepower oil-fired Erie boiler, equipped with full automatic controls. After the units are loaded into the autoclaves by the electric lift truck the pressure and temperature are gradually increased over a period of 2 hours to a maximum of 125 pounds and 354 degrees F., and they remain in this atmosphere of saturated steam for an additional 8 hours. Incidentally, the skids made from the old hand-cars are no longer used, and the skid racks are now attached to steel skid platforms which rest on vertically- and horizontally-braced steel-channel runners.

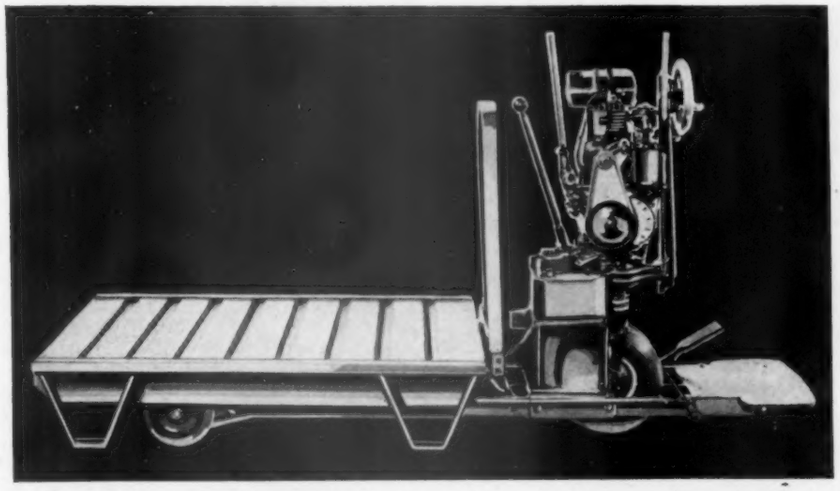
The cured units, removed from the autoclaves by the electric lift truck, are delivered on their skids and skid racks to a convenient junction point, where they are picked up by a Clark gasoline-powered high-lift truck which transfers the units to the storage yard. Here the blocks are piled up to 22 units high. This high-lift truck, which also operates the lever for latching and unlatching the autoclave doors, does several other jobs around the plant, including the heavy lifting for the changing of attachments on the Vibrapac, and considerable other high-lift hoisting work.

The construction of the new plant was done in the reverse of the usual manner. To a considerable degree the equipment was installed on the concrete floors and the buildings subsequently erected around it. Steel framing was generally used, with corrugated asbestos roofs and gable ends. Then it was up to the machinery to produce the units with which to build the curtain walls.

Operating results of the new plant have more than justified the care taken by the company's executives in planning and constructing it. Production figures and costs are quite in line with expectations.

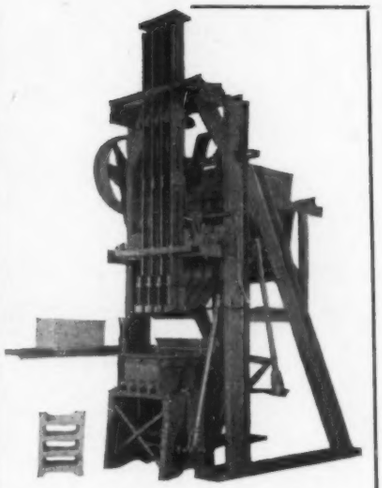
Orders recently filled include 1,000,000 square feet of 8-inch exterior walls and 4-inch interior walls for the Armistead Gardens in Baltimore; 350,000 square feet of 8-inch hollow and solid blocks for a defense housing project near the Philadelphia Navy Yard.

The home office of the Grays Ferry Brick Company is at 128 Fayette Street, Conshohocken. T. H. Lineaweaver is president and treasurer, and E. M. Prettyman is vice-president and sales manager. A. C. McConomy is manager of the home office.



The gasoline-powered lift-truck, pictured above, which costs little more than a hand-drawn unit, is built by Yard-Man, Inc., Jackson, Michigan. Power is supplied by a 1½-horsepower single-cylinder engine and the rated capacity of the truck is 2,000 pounds. The platform lift is 4 inches and is accomplished hydraulically. Its maximum speed is 6 miles per hour. The engine is readily accessible and can be replaced in ten minutes. A spare engine is said to cost less than fifty dollars.

The CONCRETE MANUFACTURER



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Because of its streamline design, a Sauerman Crescent scraper penetrates hard materials with the ease of a plow-share, and both in digging and hauling it requires much less line pull than any other scraper of equal capacity. It digs a heaping load in a few seconds, moves this load rapidly over the ground, dumps cleanly when it reaches the dumping point, and then returns at high speed to dig another load.

Write today for catalog and see for yourself how others are making big profits by using Sauerman scrapers for excavating, stockpiling and general material-handling work.

SAUERMAN BROS., INC.
534 S. Clinton St. — Chicago

LESS DEAD WEIGHT

COMMERCIAL CORED STEEL PALLETS ARE LIGHTER IN WEIGHT

In one day's production of two thousand 8" blocks, the plain pallet user handles approximately 108,000 pounds more pallet weight than the cored pressed steel pallet user and 88,000 pounds more pallet weight than the cored cast iron pallet user. Or equivalent in human effort to handling two carloads of material *—every day!*

THE COMMERCIAL SHEARING AND STAMPING CO.
YOUNGSTOWN, OHIO

Cinder Association to Defer Annual Meeting

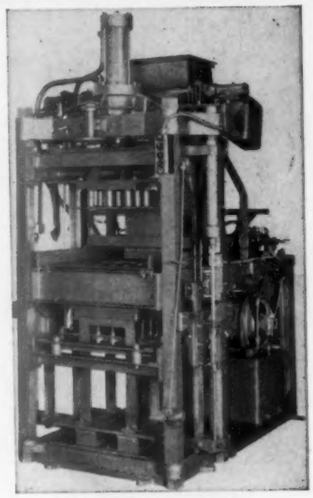
After making a careful survey of the industry and with all effort being concentrated toward winning this war in as short a period of time as possible, the officers of the National Cinder Concrete Products Association have decided that the general meeting should be deferred for this year.

However, a number of regional meetings will be held at strategic points where problems affecting the industry will be discussed, thus enabling the industry to conserve gas, tires and transportation in general, Secretary Harry H. Longenecker reports.

New Products Concern Formed at Fort Wayne

The Keystone Material & Equipment Corporation has been organized at Fort Wayne, Indiana, with headquarters at 709 Clay Street. The incorporators are F. E. Schouweiler, V. Schouweiler and J. O. Gilbert. The first named is manager of the company which will manufacture concrete and cement products.

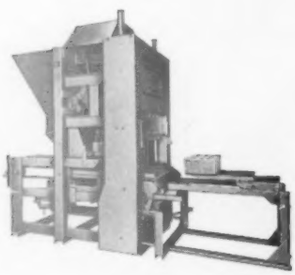
Why not BUY the LATEST FASTEST and BEST PRODUCTION BLOCK MACHINE



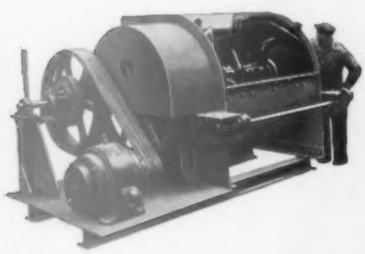
HYDRAULIC VIBRA PRESS

Write for information.

KENT MACHINE CO.
Cuyahoga Falls, Ohio



Our MULTI-MIXER with reverse screw action makes perfectly mixed concrete a "sure thing." Side, bottom and end discharge. Sizes 5 to 60 cu. ft. and larger.



Multiplex MASTER CONCRETE BLOCK MACHINES

MULTICO

"IT'S a NIFTY—got just what we need for speed, capacity and economy!"

That's what concrete block makers have been saying about MULTICO since we introduced it last year.

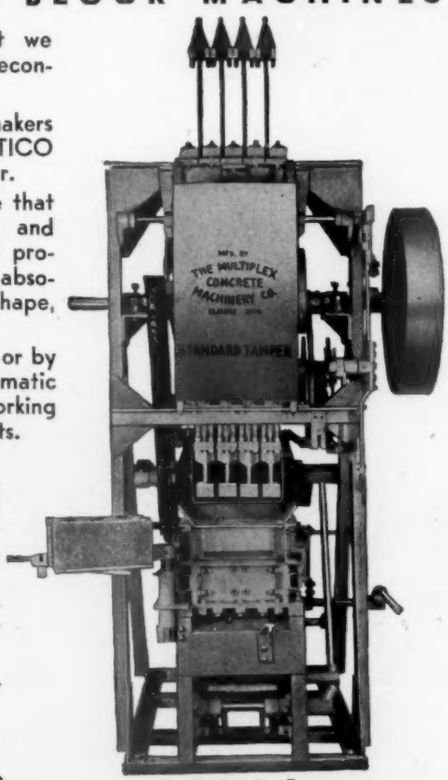
MULTICO is the ONLY machine that combines pressure, vibration and tamping, with the capacity to produce 9 blocks per minute . . . absolutely uniform and perfect in shape, surface and dimensions.

MULTICO operates electrically or by compressed air. The pneumatic method eliminates many working parts, and sharply reduces costs.

MULTIPLEX has a complete line of hand and power operated machines to fill every requirement of the concrete block producer. Choice of over 31 models available, in capacities from 400 to 3000 units per day, and in several sizes.

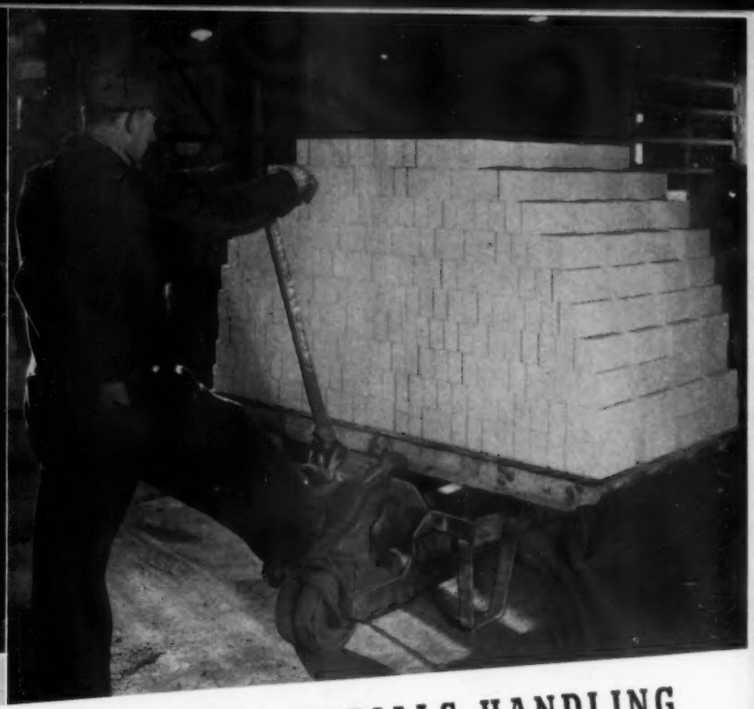
Complete products plants installed.

Write for Catalog with full details



Standard 8 Bar Tamper

The *Multiplex* CONCRETE MACHINERY CO., Elmore, Ohio



TIME-SAVING MATERIALS HANDLING EQUIPMENT HELPS SPEED PRODUCTION

Today, with the rush of orders demanding that you produce twice as much in half the time, you've got a problem on your hands. It's a production problem that calls for top efficiency in every department

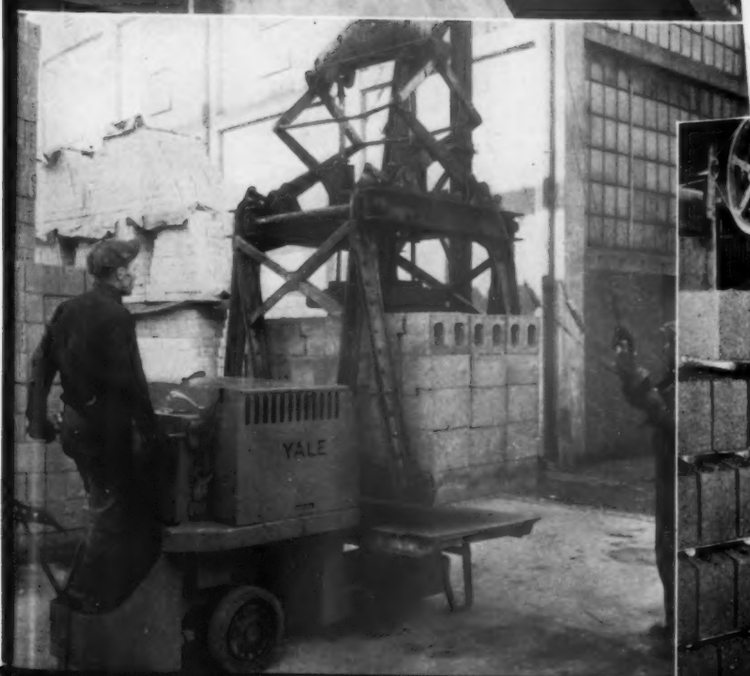
One spot where you may be able to pick up many of the extra hours needed to make that added production possible is in your materials handling operations.

On this page we present, in picture form, a proven formula for top efficiency in materials handling operations Yale Hand Lift Trucks and Electric Industrial Trucks—each is the ultimate in the application of mechanized control over lift and shift. Each is a study of how to eliminate wasted time and effort, and to increase materials handling productivity

Yale Hand Lift Trucks and Electric Industrial Trucks bring to handling jobs increased efficiency, reduced costs, minimum maintenance, maximum flexibility and availability, greater safety and a continuous flow of materials in production.

For specific details regarding any of this equipment or for information concerning any materials handling problem, get in touch with, or write to, The Yale & Towne Manufacturing Company, Philadelphia Division, Philadelphia, Pa

YALE



"Now I Know I Can Stay Within the Load Limits — — — yet Carry a FULL PAYLOAD"

Ready-Mixed Concrete Operators

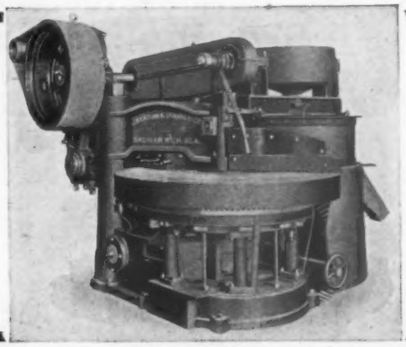
like the new No. 3 Smith-Mobile because it's a WEIGHT-SAVER. Approximately 1000 lbs. lighter than competitive 3 yard mixers, this new Smith-Mobile can be mounted on a 2-axle truck . . . carry a FULL PAYLOAD . . . and still stay within the stringent load limits imposed by practically all the states. There's no need to invest in an expensive 3-axle truck, with its extra expense, maintenance costs, tires, etc. A 2-axle truck reduces costs, yet fills the bill 100%.

Of course, the new No. 3 has all the usual Smith-Mobile features: HIGH DISCHARGE without hoist . . . CONTROLLED DISCHARGE without segregation...VISIBLE MIXING...FEED CHUTE CHARGING . . . etc. *No other truck mixer can give you all these features.* Ask for Smith-Mobile Catalog No. 198-B.

The T. L. SMITH CO.
2887 N. 32ND STREET
MILWAUKEE, WIS., U. S. A.

SMITH-MOBILE

J & C Machines help to "brick" the AXIS



When Production Counts—When Repairs Are Hard to Get—When Freedom from Breakdowns is Vital for Our All-Out War Effort—

THEN—MEN WHO KNOW machinery and recognize a superb quality of product choose J&C Brick Machines.

Because of their outstanding dependability J&C machines are making an impressive contribution to needed defense construction, such as the world famed Willow Run plant and many others.

Get the facts. Buy the BEST.

JACKSON & CHURCH CO.
Saginaw, Michigan

FASTEST POURING

Almost Any Job of Concrete Can be Done Faster with JAEGER TRUCK MIXERS

"HIGH DUMP"

Millions of yards of Jaeger Truck-Mixed Concrete on major war work (exceeding the output of all other makes combined) prove the advantages of these motorized concrete plants. Nimble, flexible and fast, they speed placement, solve problem of extended or continuous pours. Sizes to 8 Cu. Yds. Inquiries answered overnight.

or "LOW CHARGE" Type

THE JAEGER MACHINE CO.,
602 Dublin Avenue
Columbus, Ohio

Mixers—Pumps—Hoists
Paving Equipment

RESULTS . . . not promises!

LEADERSHIP isn't something that can be promised for, or argued into, a concern . . . or a magazine. Leadership must be earned and won. PIT AND QUARRY has attained that leadership in its field by giving readers and advertisers alike what they demand in an industrial publication. As a result, PIT AND QUARRY leads in *total circulation* and *producer circulation* . . . in *advertising volume* and *reader preference*.

FOLLOW A LEADER . . . subscribe for . . . advertise in

PIT AND QUARRY

STORAGE BINS

- Super strength, diagonal locking stave construction.
- Immediate erection.
- Wide range of sizes.
- Easy dismantlement.
- Thousands in service.
- Write for details.

THE
NEFF & FRY COMPANY
CAMDEN, OHIO

JEFFREY

FIRST SOURCE—FIRST CHOICE
FOR A
COMPLETE LINE OF PRODUCTS

Chains	Idlers	Pulverizers
Conveyors	Screens	Portables
Elevators	Crushers	Dryers
Feeders	Grinders	Coolers
Car Pullers		Mono-veyor systems
Transmission Machinery		Investigate

THE JEFFREY MANUFACTURING CO.
917-99 North Fourth Street, Columbus, Ohio

Baltimore	Cincinnati	Houston	Philadelphia
Birmingham	Cleveland	Huntington	Scranton
Boston	Denver	Milwaukee	St. Louis
Buffalo	Detroit	New York	Salt Lake City
Chicago	Harlan	Pittsburgh	

McCRACKEN PIPE Corrugated

The New World

A Growing Market for McCRACKEN CONCRETE PIPE MACHINES

Installations in NORTH AMERICA

Symbol*		No.	Symbol*		No.
(2)	Richmond, Va.	2	(3)	So. Beloit, Ill.	2
(2)	Newark, N. J.	1	(2)	Milwaukee, Wisc.	2
	Dover, N. J.	1		Warsaw, N. Y.	1
(2)	Boston, Mass.	1		Memphis, Tenn.	1
	Springfield, Mass.	1	(3)	Little Rock, Ark.	1
	Danbury, Conn.	1		Greenwood, Miss.	1
(2)	Atlanta, Ga.	1	(3)	Detroit, Mich.	2
	Waco, Texas	1		Escanaba, Mich.	1
(2	Columbia, S. C.	2		Kansas City, Mo.	1
	Valdosta, Ga.	1		Mankato, Minn.	1
(2)	New Orleans, La.	3		Saginaw, Mich.	1
	Houston, Texas.	1		Victoria, Texas	1
(2)	Brownsville, Texas	1		Russellville, Ky.	1
	Los Angeles, Calif.	2		Champaign, Ill.	1
	Exeter, Calif.	1	(3)	East St. Louis, Ill.	1
	San Jose, Calif.	1		Mt. Vernon, Ill.	1
	Sanford, Fla.	1		Dallas, Texas	1
(3)	Tampa, Fla.	1		Reidsville, Ga.	1
	Miami, Fla.	1		Buffalo, N. Y.	1
	Flushing, N. Y.	1	(3)	Blue Island, Ill.	1
	Washington, D. C.	1		Newfoundland	1
(2)	Poughkeepsie, N. Y.	1	(2)	Fenton, Mich.	2
	New Haven, Conn.	1		Hot Springs, Ark.	1
	Tonawanda, N. Y.	1	(2)	Huntington, W. Va.	1
	Joplin, Mo.	1		Charleston, W. Va.	1
(2)	Woodstock, Canada	1		Lilesville, N. C.	1
	Toronto, Canada	1	(3)	Columbia, S. C.	1
(2)	Ada, Oklahoma	1		Greenville, S. C.	1
	Oklahoma City, Okla.	1	(2)	Fenton, Mich.	2
(2)	Bethany, Okla.	2		Harvey, La.	1
	Iceland	1		No. of Machines	72

Installations in LATIN & SO. AMERICA

Symbol*		No.
	Bogota, Colombia	1
(3)	Cali, Colombia	1
	Pasto, Colombia	1
	Barranquilla, Colombia	1
	Medellin, Colombia	1
	Manizales, Colombia	1
	Caracas, Venezuela	1
	Valentia, Venezuela	1
	Port of Spain, Trinidad	1
	Kingston, Jamaica	1
	Balboa, Panama	1
	Honolulu, Hawaii	1
	San Salvador, El Salvador	1
	Tegucigalpa, Honduras	1
(2)	Mexico City, Mexico	1
	Culican, Mexico	1
	Monterrey, Mexico	1
	Guatemala City, Guat.	1
	Managua, Nicaragua	1
	Montevideo, Uruguay	2
(5)	Buenos Aires, Arg.	2
	Santiago, Arg.	1
	La Paz, Bolivia	1
(3)	Cochabamba, Bolivia	1
	Tarija, Bolivia	1
	No. of Machines	27

*Symbol two means 2 Resales to the same Customer and Resales mean satisfactory Performance

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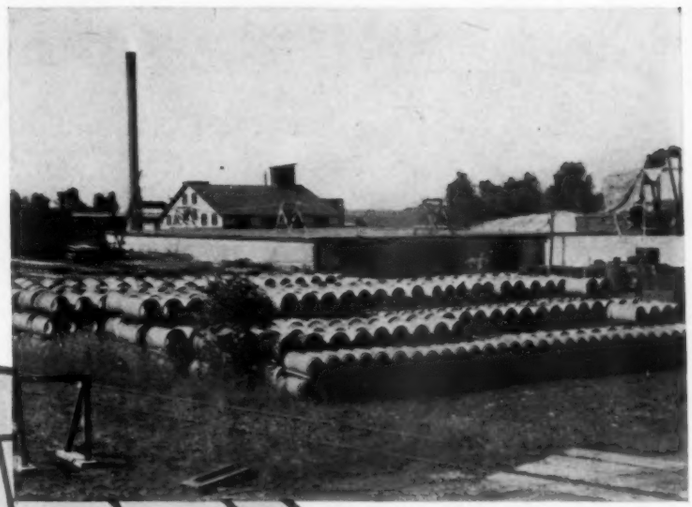
MEETS EVERY PIPE DEMAND

needs Concrete Pipe

24-hour-Daily Production by ILLINOIS-WISCONSIN CONCRETE PIPE CO. speeds war-construction program in two States



General view of Illinois-Wisconsin Concrete Pipe Company plant.

View of new McCracken Model T machine in above plant.

The Illinois-Wisconsin Concrete Pipe Company of Chicago has been operating its twin plants at South Beloit, Illinois, on a day and night basis for months, supplying concrete tubes for military construction.

More than 90% of the output is going into army and navy training centers now being erected in Illinois and Wisconsin.

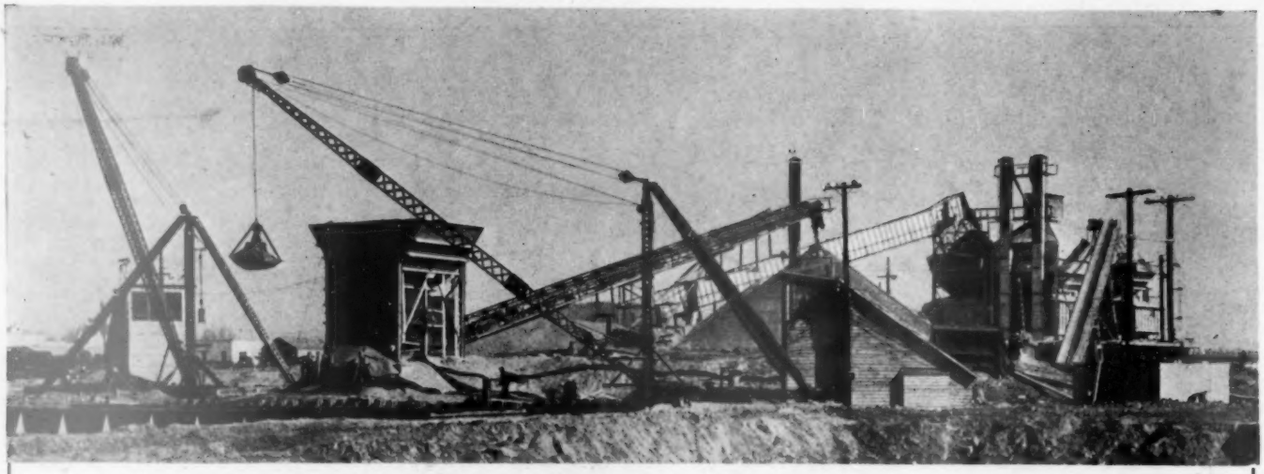
A veteran McCracken Model S unit, and a newly installed McCracken Model T machine, both made by the Concrete Pipe Machinery Co., are operating 24 hours a day, turning out pipe in lengths up to 4 feet, and diameters up to 36 inches.

The McCracken Model T Roller-Head Machine insures minimum production costs per foot of pipe. Available in a portable type which makes distant markets easily accessible.

The McCracken "Five-in-One" machine is a versatile unit for making various concrete products on a record big-profit basis. Makes building blocks, drain tiles, sewer pipe, "Wye" and "Tee" branches, and conduit.

Write for Information

CONCRETE PIPE MACHINERY Co., Sioux City, Iowa



Handling large stockpiles is accomplished by this radial stacker, tunnel belt, and two inclined conveyors. Complex layout utilizes much second-hand equipment, achieves extremely high production.

IT'S LAYOUT THAT COUNTS!

Howat Concrete Co. Achieves Efficiency In Complex Plant

Dual cement elevators handle five hundred barrels per hour. Tunnel gate can be seen in foreground.

Two lines of truck mixers are served at once for peak production. The cement bin takes care of both aggregate bins by means of automatic batching screws.

In any plant, whether large or small, the proper layout means the difference between success or failure. When the Howat Concrete Company installed a new plant to handle the enormous quantities of concrete required for the new War Department Office Building, it was only natural that they should turn to Butler engineers to handle the layout problem. Since new equipment was hard to obtain, much second-hand equipment was incorporated into the plant; yet Butler engineers solved the problem with outstanding success.

Twenty years experience have equipped them to handle any layout problem, no matter how complex. Whether your job involves a ready mixed concrete plant, central mixing plant, concrete products plant, or batching bin, let the Butler engineer sit in on the important conferences before a shovelful of dirt is turned. He may save weeks for you.

BUTLER BIN COMPANY, WAUKESHA, WISCONSIN

DYNAMITE

THE BUILDER IN WAR AND IN PEACE

From a recent DU PONT "Cavalcade of America" broadcast over the coast-to-coast N.B.C. Red Network

AMERICA in the middle of the last century was an eager, vibrant young nation struggling to grow out to her wider boundaries —struggling, but balked. Then, in Switzerland, a man invented gun-cotton—in Italy, another man invented nitroglycerin—in Sweden, a man discovered dynamite—and science placed in her hand the great, mountain-moving lever that America needed.

There are old-time blasting men who remember the great nation-building jobs dynamite handled at the turn of the century; jobs like the Panama Canal, never before thought possible. Men who have worked with dynamite since Canal days, grateful for its safety, impressed by the amount of work it does, see in it a chemical tool of infinite potentiality for mankind's benefit, both for today and for the future.

Dynamite is a prime mover. In peace, America uses a million pounds of it every day—350 millions pounds of the various types each year, produced by 25 companies in 42 plants throughout the United States. Du Pont alone manufactures nearly 200 different types and grades of dynamite. "Nitramon," to single out one Du Pont blasting agent, is the safest known. Used especially in quarrying and oil prospecting, "Nitramon" can be held in a flame or riddled with rifle bullets without danger.

In this war year, America will use an estimated 450 million pounds of dynamite. Dynamite is helping to produce more steel, more coal, more copper! Dynamite helps speed cantonments and airports; excavations and harbors. On one island outpost of the United States dynamite is quarrying 20 million yards of rock for a single giant air base. Between British Columbia and Alaska, dynamite is helping to cut and surface a 24-foot roadway 1500 miles long—the Alaska Highway. In the Tennessee Valley dynamite has helped to bring power to our war industries from the great new dams—Norris, Hiwassee, Chicamauga, Cherokee and the others—to say nothing of Grand Coulee and Boulder and Shasta of the Great West. At one Navy ammunition storage dump it's helping build 3000 igloos, as they're called, each one of which stores a quarter of a million pounds of ammunition—bad news for America's enemies!

Du Pont dynamites, weapons of production in wartime, in peace time help to bring us—*BETTER THINGS FOR BETTER LIVING...THROUGH CHEMISTRY.*

DU PONT E. I. DU PONT DE NEMOURS & CO., (INC.) Explosives Department DU PONT
Wilmington, Delaware

TO EXECUTIVES:

NOW YOU CAN HELP

Even More...

New Treasury Ruling Permits Purchases UP TO $100,000, in any Calendar Year, of Series F and G WAR BONDS!

The Treasury's decision to increase the limitations on the F and G Bonds resulted from numerous requests by purchasers who asked the opportunity to put more money into the war program.

This is not a new Bond issue and not a new series of War Bonds. Thousands of individuals, corporations, labor unions, and other organizations have this year already purchased $50,000 of Series F and G Bonds, the old limit. Under the new regulations, however, these Bond holders will be permitted to make additional purchases of $50,000 in the remaining months of the year. The new limitation on holdings of $100,000 in any one calendar year in either Series F or G, or in both series combined, is on the cost price, not on the maturity value.

Series F and G Bonds are intended primarily for larger investors and may be registered in the names of fiduciaries, corporations, labor unions and other groups, as well as in the names of individuals.

The Series F Bond is a 12-year appreciation Bond, issued on a discount basis at 74 percent of maturity value. If held to maturity, 12 years from the date of issue, the Bond draws interest equivalent to 2.53 percent a year; computed on the purchase price, compounded semiannually.

The Series G Bond is a 12-year current income Bond issued at par, and draws interest of 2.5 percent a year, paid semiannually by Treasury check.

Don't delay—your "fighting dollars" are needed *now.* Your bank or post office has full details.

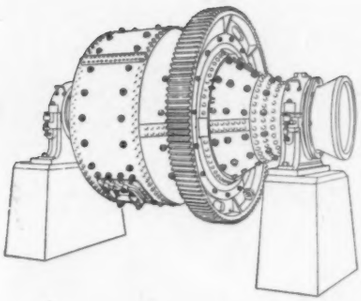
EVERYBODY EVERY PAYDAY AT LEAST 10%

Save With . . .

War Savings Bonds

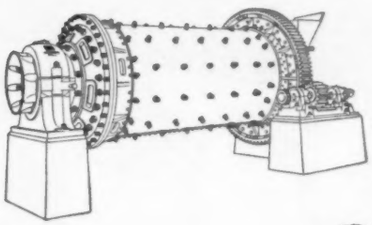
This space is a contribution to America's All-Out War Program by PIT AND QUARRY

HARDINGE



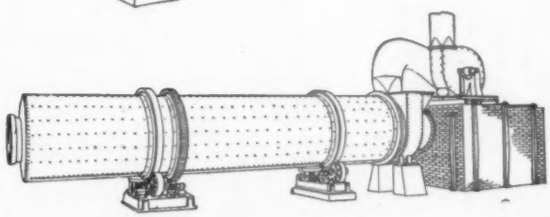
Grinding and Pulverizing Mills –

Hardinge Conical, Ball, Pebble, Tube, Rod and Batch Mills, grinding either wet or dry. For granular or extremely fine products, using classifiers or in open circuit. Bulletins 13-D and 41.



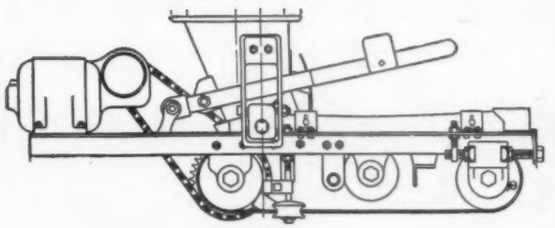
Ruggles-Coles Dryers –

Rotary Dryers—single shell, double shell, indirect heat, direct heat, steam tube types. Drying stone, clay, coal, chemicals, concentrates, sewage and the like. Bulletins 16-C and 41.



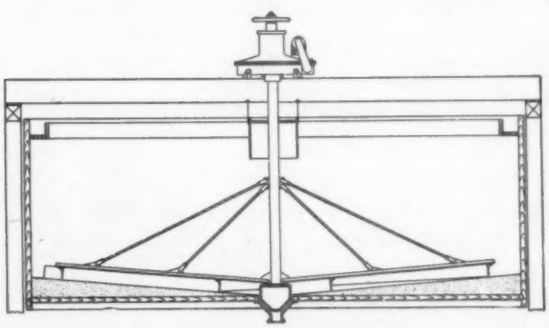
Constant Weight Feeders –

For feeding from a bin by weight which corrects for big segregation, bulking and change in weight of the material being fed. A record of the weight fed is also kept. Bulletins 33-C and 41.



Counter-Current Classifiers –

For classifying, washing, separating, cleaning and desilting. No moving parts except a slowly revolving drum. Separates from 8 mesh to 325 mesh with unusually clean sands. Bulletins 30-A and 41.



Thickeners and Clarifiers –

For continuous separation of liquids from a mixture of liquids and suspended solids. For metallurgical, industrial, chemical and sewage treatment. Bulletins 30-C, 31-C, 38 and 41.

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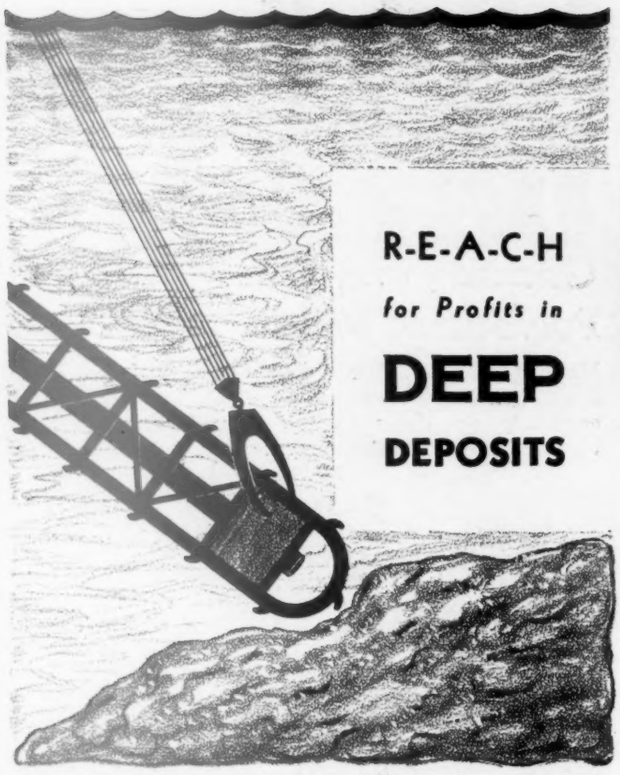
San Francisco, 501 Howard St. • Toronto, 200 Bay St.



R-E-A-C-H

for Profits in

DEEP

DEPOSITS

The EAGLE "Swintek" Ladder

The EAGLE "Swintek" Ladder goes all the way down to work those rich deposits that can't be reached with plain suction machines. This is a real PLUS-PROFIT unit that shows a major saving in power costs, cuts time and labor to a minimum, and increases pumping capacity up to 300%.

Patented SCREEN NOZZLE HEAD with screening and digging chain, cutter-equipped ... eliminates slug-pumping and insures a regular flow of solids.

YOU DON'T HAVE A WASHING PROBLEM

in the Sand and Gravel field that can't be easily solved by installing an EAGLE Washer.

"EAGLES" get maximum results in capacity, operating economy, and quality of product because of exclusive and patented features in design and construction.

EAGLE Washers are available in Spiral Screw and Paddle Log type . . . many sizes.

Write for our big Bulletin No. 41, with full details about the EAGLE complete line of sand and gravel processing equipment.

EAGLE IRON WORKS - Des Moines, Iowa

AMERICAN Crushers

Get top tonnages, continuously, with AMERICAN Crushers, built to deliver a high volume of product at low cost per ton. Rugged construction means long life, too. Manganese and other tough alloy steels, used in the right places, assure this. Capacities one to 100 tons per hour. Ask any experienced operator, or write us direct for all the facts.

AMERICAN PULVERIZER CO.
1059 Macklind Ave.
St. Louis, Mo.

for AMERICAN Industry

PROVEN PERFORMANCE

NOT THEORY

ANOTHER WAY OF SAYING

SIMPLICITY GYRATING SCREENS

The first Simplicity Gyrating Screen was built in 1922 to solve a particularly difficult screening problem. Since then many such problems have been satisfactorily solved by the installation of Simplicity Screens.

Close cooperation between the field operators and our engineers have enabled us to add refinements to the correct basic screen idea of 1922, so that the Simplicity Gyrating Screen has continued to lead in *Capacity, Efficiency* and *General Operating Conditions.*

SIMPLICITY ENGINEERING CO.
DURAND, MICHIGAN

"WE HAVE USED THIS BUCKET FOR 2½ YEARS AND RECOMMEND IT TO ANYONE WHO DEMANDS STEADY AND MAXIMUM PRODUCTION."

THE CITY EXCAVATING CO.

"We have long since realized," writes A. J. Carlozzi, president of The City Excavating Co., Cleveland, Ohio, "that your 1/2 yard Multiple Rope Bucket gives us far better service than any other make previously used, and we have used several other makes of buckets."

Williams Buckets are truly "built to last and move dirt fast". Each type we build has numerous features which have been developed by over 35 years of bucket engineering for contractors, dredging companies and steel mills. Always a leader in welded design, Williams Buckets now feature welded construction at vital points, using rivets only at certain sections where ultimate replacement may be required. Make your next bucket a Williams!

WELDED

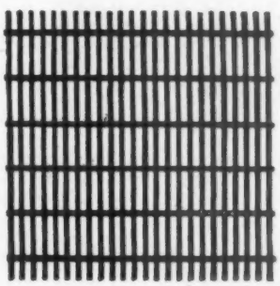
ROLLED STEEL CONSTRUCTION for GREATER STRENGTH and SPEED

Send for individual bulletins giving full information on each type of Williams Bucket.

THE WELLMAN ENGINEERING CO.
7014 Central Ave. • Cleveland, Ohio

WILLIAMS *Buckets*

built by WELLMAN



Rolled Slot

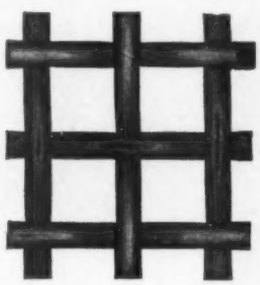
ALLOY No. 2

A super wearing Steel developed to resist the abrasion and vibration of modern screening demands.

"CLEVELAND" SCREENS

A wire cloth of guaranteed accuracy backed by fine workmanship and an effort to satisfy.

Available in Square Mesh and Rolled Slot. A trial will convince you of the superiority.



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THE CLEVELAND WIRE CLOTH & MFG. COMPANY
574 E. 78th St. CLEVELAND, OHIO

for Making 1¼", ¾" or Agricultural Limestone...

THE WILLIAMS "SLUGGER" CRUSHER AND PULVERIZER

● Handles Large Stone or Screen Rejects ●

Rows of heavy, free swinging, fast revolving hammers, crush the material by impact until of proper size to pass through the grates. By reducing large rock to 1¼", ¾" or agricultural size in one operation, the "Slugger" has enabled operators to produce these sizes at a very low cost per ton and with small investment. Seven sizes—6 to 150 tons hourly capacity.

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OLDEST AND LARGEST BUILDERS OF HAMMERMILLS IN THE WORLD
PATENT CRUSHERS GRINDERS SHREDDERS

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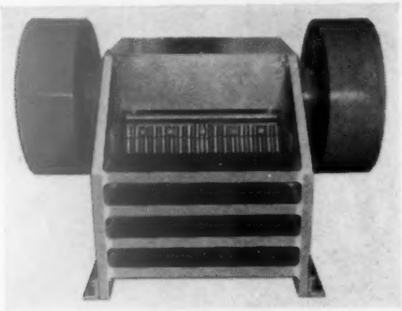
EAGLE CRUSHERS
for *Plus-Performance*



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  7 sizes 10-16 jaw opening to 18-36.
- EAGLE Impact Breakers.
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Write for full information.

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Stock shipments in all widths and all meshes. . . . Write for catalog No. 55.

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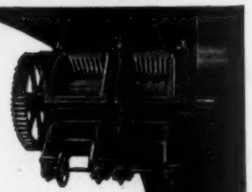
for ROCK—SAND—GRAVEL



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LOW COST SCREENING
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FIRST STEP IN
Gold Bond
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● The Savannah, Georgia, plant of the National Gypsum Co. converts 500 tons of gypsum rock into "GOLD BOND" Special plaster and plaster board every 24 hours. After the first crushing, most of this material is screened by a Link-Belt 2-deck vibrating screen. For 2½ years, a veritable torrent of crushed rock has poured through this screen, which has given continuous trouble-free operation at rock-bottom cost. As in numerous similar installations, the rugged, simple design of the Link-Belt vibrating screen has proved the answer to economical production.

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Now available from domestic sources, these genuine Nodular Flint Pebbles are equal to the best imported pebbles. "Arlcy" brand Flint Pebbles are the only amorphous flint pebbles of high quality now on the American market.

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ROUND
SQUARE
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HEXAGON
PERFORATED PLATE
of every description
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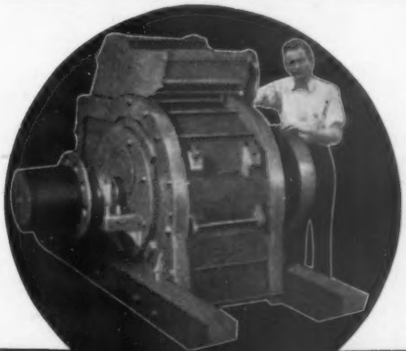

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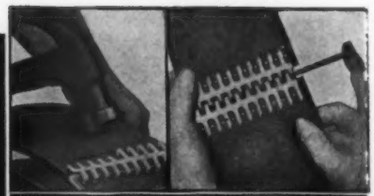
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World famed in general service for strength and long life. A flexible steel-hinged joint, smooth on both sides. 12 sizes. Made in steel, "Monel Metal" and non-magnetic alloys. Long lengths supplied if needed. Bulletin A-60 gives complete details.

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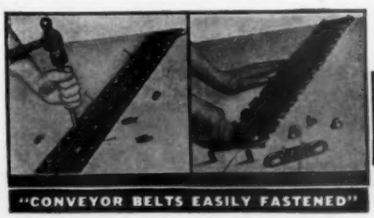
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Sizes 1½ x 1½ to 84 x 20 Crown and Straight Face

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Thousands of Gears—Sprockets—Chain—Pillow Blocks—Shafting, Etc.
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5-10-15 ton 1-2 cu. yd. bucket operating overhead crane.

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24x24 & 36x16 & 36x20 Diamond Double Roll.

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30x10 Gruendler Roller Bearing.

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400 Bbl. Portable BUTLER Bulk Cement Bin with Fuller Full Automatic Electric Push Button Weigh Batcher.

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200 K.W. RIDGWAY 3/60/2200-250-275 v., 900 rpm.

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240 K.W. F.M. 3/60/2300 v.
300 K.W. Worthington 3/60/2400 v.
125 K.W. F.M. 250 v. D.C.

RAYMOND MILL
5 Roll High Side.

CONVEYOR PARTS
BELT: 1000 Ft. 60 In., 700 Ft. 42 In., 600 Ft. 36 In., 800 Ft. 30 In., 1642 Ft. 24 In., 517 Ft. 20 In., 297 Ft. 16 In., 1000 Ft. 14 In. & 16 In.
IDLERS: 36 In., 30 In., 24 In., 20 In., 18 In.
Head & Tail—Pulleys—Takeup for all sizes.
Steel Frames: 2,000 Ft. 24 In., 30 In. & 36 In. Sections.

ROTARY DRYERS AND KILNS
36 In. x 20 Ft., 3 Ft. x 30 Ft., 4 Ft. x 30 Ft., 54 In. x 30 Ft., 42 In. x 24 Ft., 5 Ft. x 30 Ft., 8 Ft. x 16 Ft., 5 Ft. x 60 Ft., 6 Ft. x 60 Ft., 6 Ft. x 70 Ft., 70 In. x 40 Ft., 5x30 & 8x84 Double Shell Dryers, 8x110, 7½x100, 8x125 & 10x20 Kilns.

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GUY: 8 Ton 85 Ft. Boom, 15 Ton 100 Ft. Boom, 20 Ton 115 Ft. Boom, 50 Ton 100 Ft. Boom.
STIFF LEG: 5 Ton 70 Ft. Boom, 15 Ton 100 Ft. Boom, 25 Ton 100 Ft. Boom, 75 Ton 135 Ft. Boom.

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84" x 56" Allis-Chalmers Jaw Crusher

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42"	5	1/8" — 1/16"
36"	6	1/8" — 1/16"
30"	6	1/8" — 1/16"
30"	5	1/8" — 1/16"
24"	5	1/8" — 1/32"
24"	4	1/8" — 1/32"
20"	5	1/8" — 1/32"
20"	4	1/8" — 1/32"
18"	4	1/8" — 1/32"
16"	4	1/8" — 1/32"
14"	4	1/16" — 1/32"
12"	4	1/16" — 1/32"

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Width	Ply	Width	Ply	Width	Ply
18"	6	10"	6	6"	5
16"	6	10"	5	5"	5
14"	6	8"	6	4"	5
12"	6	8"	5	4"	4
12"	5	6"	6	3"	4

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Width	Ply	Top & Bottom Covers
12"	6	1/16" — 1/16"
14"	6	1/16" — 1/16"
16"	6	1/16" — 1/16"
18"	6	1/16" — 1/16"

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12—10 to 15-yd. Scrapers with RD-8 Tractors.

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1—32″ x 8′ 0″ Gates Revolving Screen, right hand drive, fitted with wood frame, and new style feed spout, arranged for sprocket drive, from special counter shaft without dust jacket.
1—No. 3 style "C" Gates Geared Head Elevator, 27′ 0″ centers, left hand drive fitted with wood frame, but without safety device, arranged for Texrope drive.
1—No. 4 style "C" Gates Geared Head Elevator, 24′ 0″ centers, right hand drive, fitted with wood frame, but without safety device, arranged for Texrope drive.
1—Lot of line shafting for driving Apron Feeder, 32″ screen, and crushing rolls, driven by Texrope drives.
4—12″ x 14″ Quadrant Bin Gates, without spout extension.
1—18″ x 5′ 0″ Apron Feeder, Ratchet Drive, complete with structural steel frame, left hand, arranged for sprocket drive from countershaft, without driving pulley.
1—Set of 30″ x 14″ "Type "B" Crushing Rolls, complete with smooth Rolled Steel Shells, Housing, Feed Hopper and Driving Pulley, but without foundation bolts, set for making ¼″ product.
1—20″ Troughing Belt Conveyor (Iron work only), Standard drive, 70′ 0″ centers, without belt or pulley, including 16 carrying rollers and 6 return rollers, arranged for Texrope drive.
1—14″ Troughing Belt Conveyor (Iron work only), standard drive, 18′ 0″ center distance, without belt or pulley, including 3 carrying rollers and 1 return roller, arranged for Texrope drive.
1—8″ x 39′ 0″ Verticle Bucket Elevator, (308), with style "B" spout, complete with flanged type steel casting, chain and buckets, but without driving pulley, arranged for Texrope drive.
2—Type 39—4′ Hummer Electric Screens, one screening surface, including V-32 Electric Vibrator and expansible screen frame, and balanced gate feeder.
1—Type 39—4′ as above except double deck.

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1—20 H.P., type ARY, 60 cycle, 3 phase, 440 volt, 1145 RPM, slip ring, fitted as above for driving 30″ x 14″ style "B" Crushing Rolls.
5—5 H.P., type AR, 60 cycle, 3 phase, 440 volt, 1200 RPM, squirrel cage for driving 20″ conveyor, 18″ Apron Feeder, 8″ elevator, and No. 3 and No. 4 style "C" elevators.
5—WK-20 starting switches.
5—Sets 19″ Rails for above motors.
1—3 H.P. Type AR, 60 cycle, 3 phase, 440 volts, 1200 RPM squirrel cage, for driving 14″ conveyor.
1—WK-20 Starting Switch.
1—Set of 18″ Rails for above motor.
1—7½ H.P., type AR, 60 cycle, 3 phase, 440 volts, 1200 RPM, squirrel cage, for driving 32″ x 8′ 0″ screen.
1—No. 261106 Starting Switch.
1—Set of 22″ Rails for above motor.
Texrope Drives—for equipment mentioned above.

Pumping Equipment

One (1) American Well Works 2″, type HS-DSMB centrifugal pump, ball bearings, designed to deliver 200 gpm., against a 210 ft. total head, serial No. 53262. Driven by a 15 h.p. General Electric type KT squirrel cage motor, 440 volts, 3 phase, 60 cycles, 3600 rpm, with remote control starting compensator, General Electric type CR7051.
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One (1) 2½″ HS-DSMB American Well Works horizontal double suction, split shell centrifugal pump designed to deliver 300 gpm. against 100 lbs. discharge pressure when operating at 3500 rpm. Mounted on same bedplate and driven by a 25 h.p. General Electric type K.T. motor, 440 volts, 3 phase, 60 cycles, 3450 rpm. Motor controlled by a type CR7006-D7 automatic magnetic starter.
1—Centrifugal Pump equipped with General Electric 5 KF-324C2 Induction Motor, 220/440 volts, 15 HP, 3500 RPM.
One (1) Ingersoll Rand Company motor driven centrifugal pump (overhung type), 1″ intake, 2″ discharge, driven by 1½ h.p. General Electric motor, 220/440 volts, 3 phase, 60 cycles, 3500 rpm., model No. 5K204B978.

American Hoist

One (1) No. 3861-100 American Hoist & Derrick Company double friction electric hoist with double ventilated brake rings, equipped with General Electric 100 h.p., type M. T. C. 5552 hoist motor, 440 volts, 3 phase, 60 cycle, 720 rpm., geared to handle 16,000 lbs. on a single line at 155 ft. per minute. Serial No. 1886.
One (1) No. 169-20 Single drum slewer with General Electric 20 h.p. type M. T. C. 5512 hoist motor, 440 volts, 3 phase, 60 cycle, 900 rpm., geared to handle 8,000 lbs. on a single line.

Drilling Equipment

Two (2) Ingersoll Rand Company, No. X72 drifter drills mounted on 5½″ quarry bars. Designed for mounting on wagons, tripods, and drilling and broaching machines.
Two (2) Ingersoll Rand Company No. S-49 Jackhammers for 1″ air hose. Size steel shank—1″ x 4¼″.
One (1) Ingersoll Rand Company type 27 tripod for drifter drill, complete with weights.
1—Ingersoll-Rand Calyx Drill with motor.

Dust Collector Systems

Complete Pangborn Dust Collector System, type CH583, with all metal cloth screen collector with classifier section built integrally with and ahead of cloth screen section. Complete with all necessary piping, fans, bins and drives.

Miscellaneous Equipment

One (1) one cubic yard stone grapple for single holding and single closing line industrial crane. C. H. Williams, Erie, Pa.
One (1) 18′ x 18′ wood and steel plate blasting mat.
One (1) lot of rock skips as follows:
1—2 yard capacity
1—2½ yard capacity
1—4 yard capacity
1—9 yard capacity
Two (2) sets of steel stone hooks.
One (1) 12″ two wheel heavy duty electric grinder, 3 h.p., 440 volts, 3 phase, 60 cycles, 1800 rpm., serial number B1187H. Built by Marschke Manufacturing Co., Indianapolis, Ind.
One (1) Rotap testing sieve shaker, with 18 testing sieves. Driven by ¼ h.p., 514E Ohio Electric motor, single phase, 60 cycles, 110 volts. Serial No. 64171. Built by W. S. Tyler Co.
Miscellaneous elevators, conveyors and piping installed in crusher house and can be removed for re-use.
1—J. A. Fay & Egan Swing Saw with built-in 5 HP, Louis Allis Type CT Motor, 220 volts, 3 phase, 60 cycle, 3400 RPM, Serial No. 138468.
1—8-ton Peerless Chain Hoist.
2—30-ton Joyce Griedland Hydraulic Jacks.

Would like to hear of your interest in the complete plant or individual items. Contact

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Index to Advertisers

American Cable Div. American Chain & Cable Co., Inc. ..... Inside Back Cover
*American Chain & Cable Co., Inc. ..... Inside Back Cover
American Manganese Steel Co... 67
*American Pulverizer Co..... 94
*American Steel & Wire Company. 7
Anchor Concrete Machy. Co..... 83
Atlas Powder Co..... 8
*Austin-Western Road Mach. Co., The 19

Bacon, Inc., Earle C..... 72
*Barber-Greene Co. 15
Barjohn Corporation, The.....105
Birmingham Rail & Loco. Co....104
Bledsoe Co., Walter..... 99
Brill Equipment Corp..... 99
Broadcast Section 98-105
*Brooks Equipment & Mfg. Co.... 97
*Buell Engineering Co., Inc..... 24
*Butler Bin Co..... 90

Carlye Rubber Co., Inc.....101
Cawood Co., The Richard L..... 97
Chicago Perforating Co..... 70
Cleveland Wire Cloth & Mfg. Co. 95
*Columbia Steel Company..... 7
Commercial Shearing & Stamping Co., The 84
Concrete Pipe Machinery Co...88-89
Concrete Transport Mixer Co., Inc. 106
Consolidated Products Co., Inc..100

*Deister Concentrator Co..... 73
*Dempster Bros., Inc..... 96
*Denver Equipment Co..... 96
*Diamond Iron Works, Inc..... 66
DuPont De Nemours & Co., Inc., E. I. 91

Eagle Crusher Co., Inc..... 96
*Eagle Iron Works..... 94
*Easton Car & Construction Co... 1
Eimco Corp., The..... 3
*Ensign-Bickford Co., The..... 2
Equipment Corporation of America 100-101

Flexible Steel Lacing Co..... 97
*Fuller Co. 14

Gates Rubber Co., The..... 9
*Gruendler Crusher & Pulverizer Co. 74

*Haiss Mfg. Co., Inc., Geo..... 74
Hallowell, Horace J.....103
*Hardinge Company 93
*Hendrick Mfg. Co..... 97
Hoffman Bros. Drilling Co.....103

Industrial Machinery & Supply Co. 98

*Jackson & Church Co..... 87
*Jaeger Machine Co..... 87
*Jeffrey Mfg. Co..... 87

*Kennedy-Van Saun Mfg. Co. & Eng. Corp. 20
Kenney Mach. Co., George C....104
Kent Machine Co..... 84
Keystone Driller Co..... 68
Koehring Company 13

*Laughlin Co., Thomas..... 65
Lefton Industrial Corp..... 105
*Link-Belt Co. 97
Ludlow-Saylor Wire Co. ..... Inside Front Cover

Mack Trucks, Inc..... 4
Marion Steam Shovel Co., The... 11
*McLanahan & Stone Corp..... 96
*Morris Machine Works..... 71
*Multiplex Concrete Machy. Co.. 84

*National Wire Cloth Co., Inc... 96
Neff & Fry Company..... 87
New Holland Machine Co..... 72
Northwest Engineering Co..... 21

*Owen Bucket Co.....106

Patterson Equipment Co.....104
Pennsylvania Drilling Co.....103
Pettibone Mulliken Corp..... 6

*Raymond Pulverizer Div. of Combustion Engineering Co., Inc.. 22

*Sauerman Bros., Inc..... 83
Schaffer Poidometer Co..... 70
Simplicity Engineering Co..... 94
*Smidth & Co., F. L..... 96
Smith Engineering Works. Back Cover
*Smith Co., T. L..... 86
Southern Iron & Equipment Co.. 98
Standard Metal Mfg. Co..... 96
Stanhope, Inc., R. C..... 99
*Stearns Mfg. Co..... 75
Stoody Company 73
Straub Manufacturing Co..... 5

Taylor Forge & Pipe Works.... 10
Teuscher Pulley and Belting Co. 98
*Traylor Engineering & Mfg. Co.. 69
*Tyler Co., The W. S..... 74

Union Wire Rope Co.....17-18
U. S. Treasury Department..... 92
*United States Steel..... 7
Unverzagt, G. A.....101

Walsh Co., R. P.....105
Webber Equipment Co.....100
Wellman Engineering Co..... 95
Whayne Supply Co., R. C..... 98
*Wickwire Spencer Steel Co..... 12
*Williams Pat. Crusher & Pulverizer Company 95

Yale & Towne Mfg. Co., The... 85

***See also Detail Information in the 1942 Pit and Quarry HANDBOOK**

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★ Inspect, clean and lubricate all wire rope regularly. Tighten fittings. Be sure hemp core is not dry, or corrosion or collapse may occur.

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★ Don't allow bad spooling on drums. Spaces between wraps, or crossed wraps, cause crushing and binding. **TRU-LAY PREFORMED** spools better than most ropes.

Conserve steel by making your present equipment last longer. Proper inspection, lubrication and maintenance will make long-life **TRU-LAY PREFORMED** last *longer*.

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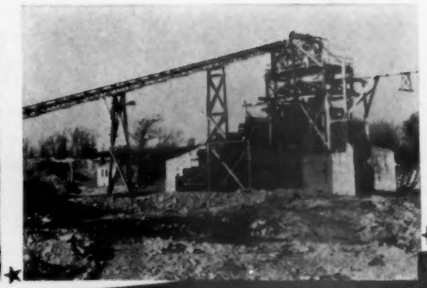

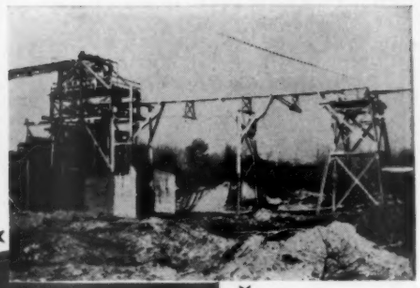

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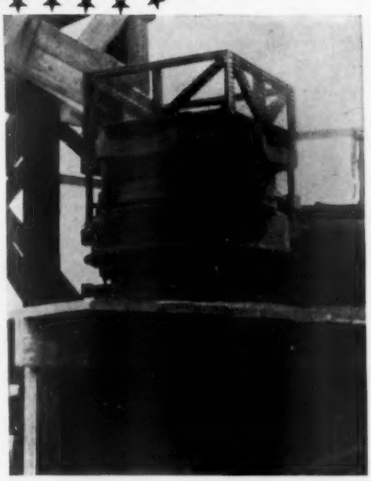
TELSMITH

Telsmith 18 x 30 Roller Bearing Jaw Crusher (left) handles plus 3¼″ material. It is fed by Telsmith 30″ x 5′6″ Reciprocating Plate Feeder over a Telsmith No. 450 Rotary Grizzly with 3¼″ spaces. Feeder takes raw bank material from 15 cu. yd. hopper fitted with a rail grizzly to reject the few oversize boulders. Crushed material, and minus 3¼″ from Rotary Grizzly are conveyed to scalping screen (lower left).

Telsmith 4′ x 10′ Single Deck Pulsator (lower left) acts as a scalping screen. Minus 2″ throughs go to finished product conveyor; plus 2″ oversize into Gyrasphere Crusher (right).

Telsmith No. 36 Gyrasphere (upper right) crushes oversize or plus 2″ fed to it from the Telsmith Scalping Screen (left). The crushed product is returned to the 30″ x 87′ primary conveyor by an 18″ x 48′6″ belt conveyor.

Telsmith 5′ x 12′ Triple Deck Pulsator (right) in structure over storage piles, sizes the gravel and sand. The 3 sizes of washed gravel are deposited over tunnel at grade level for truck loading from live storage, or by loader outside stock piles. The sand is flumed to a No. 8 Telsmith Sand Tank independent of main structure, for stock piling. G-9



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